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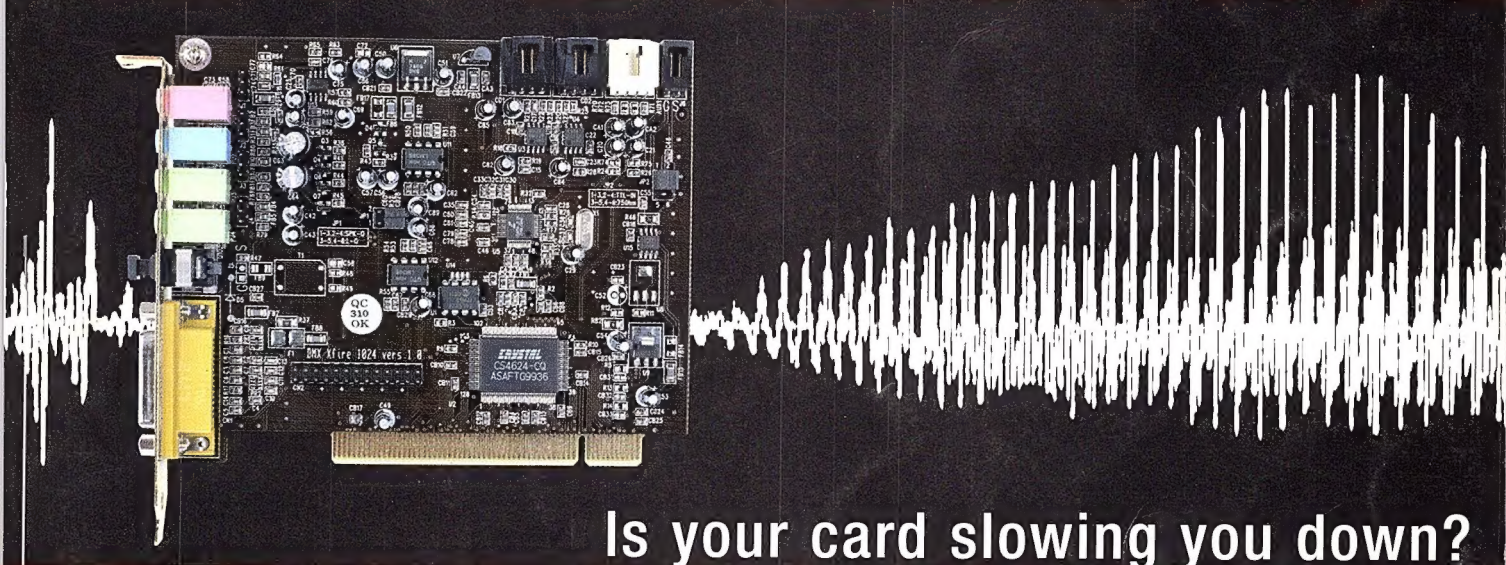
atomic

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ULTRA COOL How to build a PC in a bar fridge
CIVILIZATION III Is this the end of Civilization?
BANDWIDTH Who needs it?



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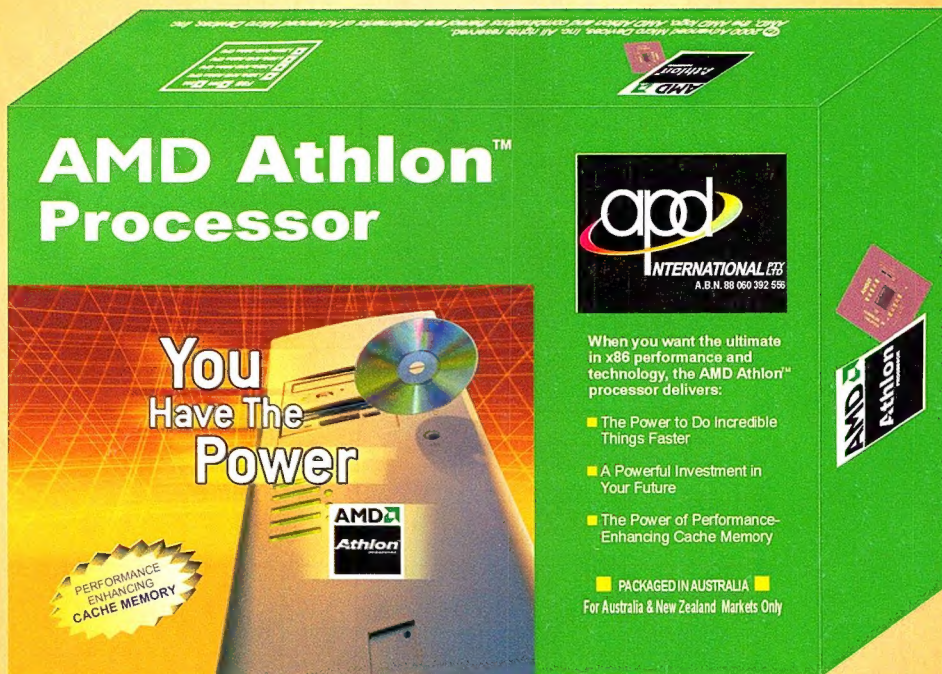
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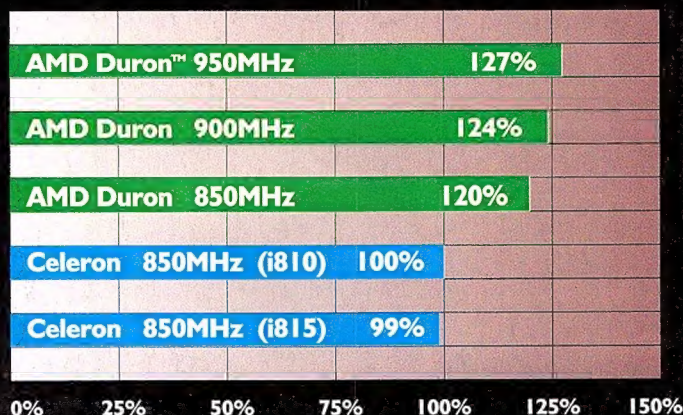
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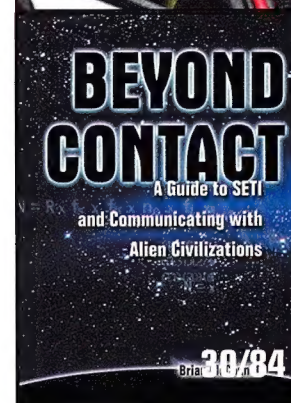
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Learn what is eventually going to go wrong with your PC.

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Your time is running out if you want to get a 12-month subscription of Atomic Magazine for a piddly \$39. You didn't think this ridiculously low price would last forever, did you? From issue 11 a 12-month subscription is going to cost you an extra \$10, which could be better spent on five blank CD-Rs, a really budget nine-year-old DOS game, or even a night with one of the Atomic writers. That last bit explains the need for a price rise. Even if you don't want to save yourself a tenner, the fact that we're giving away five 'Out of This World' book packs should be enough to lure you to our subs page to find out just how fab these books are.



COMPETITIONS

96

AMD's new 1GHz Duron is one mean-looking beast, and you could end up strapping a free one into your PC. Or you could get your hands on a ticket to robot heaven with a copy of MechCommander 2.

OFFICIAL! NUMBERS DON'T COUNT



Competition is fierce. In order to convince a potential customer of its product's superiority, a company must be able to demonstrate clear, indisputable advantages over the opposition's gear. In some areas of enterprise this can be fuzzy and ambiguous. Do 'the burgers taste better at Hungry Jacks'? Not by any scientifically measurable system they don't. Instead this important decision is left to the subjectivity of the consumer.

We've always been much luckier. Knowing which PC component to buy has been

mathematically indisputable. Your average Harvey Norman shop assistant could satisfactorily explain to an average customer why a 1GHz Pentium III Packard Bell was near enough to twice as fast as a 500MHz model. Once the customer managed to get their brain around RAM and hard drive space, they were set to make a purchasing decision and be confident about their performance expectations.

The reliability of this system has disintegrated with the release of the Pentium 4. It was quickly discovered that a 1.4GHz Athlon would comfortably out-perform a 1.7GHz Pentium 4, but try explaining that to an average Joe. AMD was suddenly faced with a conundrum – it now had to convince the layman that less is actually more, and that conventional GHz vs. GHz was no longer a reliable yardstick.

While we Atomicians get a thrill from debating the relative strengths of the Pentium 4's high-bandwidth architecture, eventual SSE2 support and the pros and cons of a longer instruction-set pipeline, average Joe is in a state of major confusion.

To alleviate this mess AMD is dumping the actual frequency rate from new product names in favour of a contrived rating that's supposed to more accurately reflect how it performs in the real world, or more specifically, against the P4. Hence, the Palomino Athlon 1.4GHz will be badged as an 'A1600'. While this is debatably helpful to clueless system buyers at major chain stores, it's only an interim fix and in fact creates more problems than it solves. How is a customer going to feel when they discover their 1.6GHz system is only running at 1.4GHz? Like suing, perhaps? How long will this fuzzy math hold out? While sort of accurate for now, this new rating system will rapidly become useless, as the P4's software base develops. AMD doesn't appear to be using a proper point of reference. It's as useless and confusing – and irritating – as the 'P-Rating' Cyrix pulled on us a few years ago. But that was Cyrix and therefore wasn't relevant; this is AMD and it has a responsibility to provide more meaningful indicators of relative performance.

Let us hope, for the sake of well-intentioned but ignorant buyers, that a better system replaces what AMD is proposing. Preferably, the whole plan gets thrown out. Yes, we have moved past the straight 'biggest number is best' era, but what confused computer buyer hasn't turned to the advice of a trusted shop assistant, friend or magazine to make the right decision when spending thousands of dollars on something as complex as a PC? They all do. So, as long as we all do our jobs right and keep giving good advice, then this dangerous over-simplification of computing power will be unnecessary.

Hell, no company has stressed the irrelevance of CPU frequency more than Apple, yet in all these years it has resisted the temptation of naming a false god in its holy war against the PC. Instead, it has educated its users. AMD?

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MAXIMUM POWER COMPUTING

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Editorial and product submission

Atomic welcomes all information on new and upgraded products and services for possible editorial coverage. However, we respectfully point out that the magazine is not obliged to either review or return unsolicited products. The editor welcomes ideas for articles, preferably sent in outline form, with details of author's background and samples of previously published work. We cannot accept responsibility for unsolicited copy and stress that it may take time for a reply to be sent out.



IT'S WHAT'S ON THE INSIDE & OUTSIDE THAT COUNTS



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Short Circuits

More news on the Telstra class action lawsuit. Latest count on plaintiff numbers is 110 confirmed, and over 500 possible, but as yet unconfirmed. Atomic spoke to Simon Moore, a researcher who is assisting lawyer Michael King with the case.

According to Moore, the majority of people contacting King and himself are from businesses, predominantly those with a heavy reliance on a constant online presence such as Internet cafes. It is these businesses that require a reliable Internet connection to survive that are pushing for a high amount of compensation, which, according to Moore, 'will be in the hundreds of thousands . . . depend[ing] on the confirmed complainants.' So far, Telstra has neglected to contact King regarding the class action.

Moore's final word? 'It is a shame to see a company, still Australian owned, dive to such low levels of satisfaction amongst . . . a lot of customers, meanwhile claiming the highest profits and customer service standards.'

The long-awaited amalgamation of the two strains of Windows is almost at hand. Windows XP, which is based on Windows 2000 code, has been released to manufacture. The product isn't scheduled to be launched until 25 October, but the long lead time means that PCs equipped with Windows XP will be ready to ship as soon as it is commercially released.

In fact, computer manufacturers are so excited by this development that they are predicting the release of XP will suddenly make people want to buy new PCs again. See? There is a positive use for bloatware in this modern day and age.

3.5GHz P4!

At a recent Intel Developer Forum in San Jose, California, Intel executive vice-president Paul Otellini outlined the future direction of the chip-making giant. During his speech about how the Pentium 4 is expected to ramp up speed wise, Otellini demonstrated a working 3.5GHz Pentium 4 chip! We will politely forget to mention Intel's incessant warnings to all and sundry on the problems of basing chip comparisons entirely upon 'GHz' ratings, as we are thrilled and intrigued nonetheless.

One major consideration that Otellini failed to mention was how Intel would manage to cool this sucker down enough to make it even remotely useable. We can assume that the chip was based on the 0.13-micron Northwood core that is due for release sometime in the near future. This die shrink should make for cooler CPUs. The Pentium 4 has been designed to manage heat in very specific ways, such as the use of the integrated heat spreader and thermal throttling, as well as needing some fairly heavy chunks of metal to use as heatsinks.

Admittedly, it will be quite a while before a 3.5GHz Pentium 4 chip is anywhere near ready for market release, but the mere fact that Intel has managed to produce a working chip so far beyond current speed levels has

us here at Atomic positively drooling over possible Sandra SiSoft results – to say nothing of frame rates in our Quake 3 system test.

The other interesting announcement made by Otellini was Hyper-Threading technology, which enables a single physical processor to be treated as two logical processors. According to Intel this is achieved through 'developing an architecture state for two processors which share a single physical processor's resources'. Each logical processor can be controlled and utilised independently of the other, sharing the basic components of the CPU such as the ALU, address register, and the like. This will allow future Intel processors to run two threads simultaneously and, according to Intel, provide a performance gain of up to 30% on certain (optimised) applications.

The first planned implementations of the technology will be in Intel's Xeon line of server chips, so we will all be (anxiously) waiting just that little bit longer for a taste of virtual symmetric multiprocessing. □



Court in the Net

Our courts were in less than top form this month as the Victorian Supreme Court ruled on a defamation case that has far-reaching implications for all Internet users the world over.

The case itself was in response to an article that appeared in an October 2000 issue of Barrons Online, an Internet-based business publication. Defamation was judged to occur when it was implied in an article that Melbourne-based businessman Joseph Gutnick was a customer of convicted tax evader and money launderer Nucham Goldberg.

The personal outcome for Gutnick, and the associated compensation, are not the important issues here. What is significant is the presiding Justice Hedigan's reasoning for ruling in Gutnick's favour. Hedigan stated that, due to the ability of Victorian Internet users to retrieve the Barrons Online publication, Dow Jones had effectively published its journal in Victoria, making it subject to Australian defamation laws.

Not yet seeing the bloodcurdling implications? Not only does this ruling apply Australian defamation laws to all online content regardless of hosting location, but it could be argued that there is now precedent to apply all Australian laws to content appearing on the Internet. And if Australia can do it, why not the rest of the world? America already seems to consider its laws as applying to the rest of the world after

recently indicting Russian programmer Dmitry Sklyarov for coding a program (in Russia, mind you) that violates the American Digital Millennium Copyright Act.

If this ruling is not overturned on appeal, who knows where the madness will stop – will Australian Internet censorship laws apply everywhere? Could we have a repeat of the Afghan Taliban's decision that its bans on music and pictures of living creatures apply to all and sundry, regardless of where the content is hosted?

We don't have much to worry about on the Afghani front, as the recent Taliban ban of the Internet means that no-one there can see it. If they can't see it, it doesn't exist. And if it doesn't exist, they can't sue us for it. □

Friesian goes home

In late August, everybody's favourite vendor of cuboid legless cows – Gateway – shut up shop in Australia, along with closing down its operations in New Zealand, Malaysia, Singapore and Japan.

The move did not come as much of a surprise given the global restructuring that the company has undertaken in the past couple of months. By 'global restructuring' we mean 'taking its ball and going home'. Gateway will continue to operate in the US only, and attempt to consolidate its position before turning to international markets again.

Why, we hear you ask? Gateway was posting good sales, wasn't it? Sure, but that's only half the story. According to Gateway CEO Ted Waitt, Gateway doesn't have the strong brand recognition distribution and partnerships overseas like it does in the US.

We don't know whether Waitt has ever been to Australia and seen the vast fields of legless cows spreading throughout our culture, or whether he realises that New Zealand has a strong (many say unnatural) affinity with the dairy industry and cows, or whether he realises that from here on in the most memorable thing about Gateway will be that it simply couldn't cut it, and ran home in a panic. Now *that* is brand recognition!

In any case, while this doesn't heavily impact on the Atomic Labs, it is a sad day for computing in general, when one of the major international vendors essentially declares that things are so bad that it can't even trade its way out of a little dip in the market. On the positive side, this should mean some serious competition in the PC market in the lead-up to Christmas.

The real question is, how will it affect the beef market? □



Australia's online habits

The results are in and it's official. According to Nielsen//NetRatings, figures for the global Internet populace have grown to 460 million people, up by 30 million since quarter one, 2001. Australia clocked in with 9.7 million users, which means we comprise approximately 2.1% of the global Internet population.

The list of our top 10 favourite sites for the month was a rather mundane list, the only notable exceptions being ninemsn (can you say 'Hotmail redirect?'), Google (admit it, Google rOx your world) and Telstra. Speculation at this time about disgruntled ADSL customers making up the majority of traffic to the Telstra Web site wouldn't be appropriate, and so we won't mention it.

Australian Net surfers are an inattentive lot overall, with an average page view of 51 seconds. That's barely long enough to read a single news post or story, let alone the content of your average front page on a major site. On a positive note, the average time spent at each site was 28 minutes, meaning that a fair percentage of content was seen. Interestingly, the average session length was 35 minutes, showing that the typical Aussie Net user goes online mainly to peruse a single site in each session.

Interestingly enough, the average time spent online by

American Net users was just over 31 minutes per session and their average page view time matched ours at 51 seconds.

About the only thing missing from the Nielsen//NetRatings report was speculation on the amount of traffic congestion the new users have caused. Or, more specifically (and more importantly), how much of the congestion is due to 30 million new Internet users trying to find all this amazing online prOn they've heard so much about.

Are we the same as the Yanks? Is our Net access being slowed by all those newbies who just can't get enough prOn? There's only one way to sort out the real answer to this conundrum. To the forums! □

Short Circuits

◀ The battle for top dog in the search engine business is heating up, with two relative newcomers challenging the reigning king Google. Teoma and WISEnut are the two new engines who dare to usurp Google from its well-deserved position as top dog of the search tools.

Teoma uses a topic-specific method of grouping search results, which works by indexing search results into communities based on specific subjects. Authoritative sites within each community are then identified and returned to your browser under the heading Expert's Links, along with regular results.

If you don't fancy Teoma, then WISEnut is pushing its WISErank relevancy rating system, which 'not only measures the relative importance of a given page, but also determines the relative relevancy of that page for a given query'. It even claims to have indexed more pages than our beloved Google!

◀ When the Xbox was announced, Microsoft was adamant that it was going to launch simultaneously in Japan and the US. The Japanese market is the most console-obsessed out there, and it is probably going to be the most difficult market for Microsoft to break into.

Recent announcements from Microsoft have changed these early plans entirely, with the Japanese launch pushed back to 22 February next year.

On the plus side for Microsoft, Nintendo has also pushed its US launch of the GameCube back by a few weeks, which means that the Xbox will have a small amount of breathing room in the US marketplace to gain a much needed foothold.

Short Circuits

▲ Australian Labor party MP Mr Tony Kelly has been cleared of 'hacking' accusations after police determined that suspicious programs stored on Mr Kelly's computer were most likely used for security purposes, and not to compromise other systems.

According to a source in Mr Kelly's office, one of the programs found on the PC confiscated by police was a security tool called LAnguard, of which there are several different implementations. Unfortunately, our source was unable to provide information on precisely what LAnguard product it was.

Interestingly, despite Mr Kelly's name being cleared and the distinct lack of evidence as to who did the deed, Opposition files were definitely present on the computer, so investigations will continue.

This follows on from the initial incident earlier this month when it was alleged someone in Mr Kelly's office had accessed confidential files stored on the computer of Mr Charlie Lynn, the Opposition shadow cabinet secretary.

▲ Just when everyone thought that it had disappeared from view, among the focus upon bus level I/O standards, Serial ATA is back with a vengeance.

It was announced at the recent Intel Developer Forum Conference, and has support from industry heavyweights such as Dell, Intel, IBM, Seagate and Maxtor.

The new standard for hard drives provides scalable bandwidth and starts at a throughput rate of 1.5Gb/s. However, the thing that has got us really excited is the final death of the IDE ribbon cable.

Imagine a future in which all cables are rounded . . .

Playing silly buggers

Changes abound in the gaming industry this month, with several major announcements made by players around the globe – most of them decidedly bad.

Game lovers the world over were shocked earlier this month when Sierra On-Line dropped a bombshell announcement stating the closure of Dynamix, maker of such classic games as The Incredible Machine, Aces over Europe and, more recently, the Tribes series. The closure is part of a larger restructuring at Sierra, which, according to Sierra, has the aim of 'improv[ing] operating efficiencies through the consolidation of non-developmental functions'. Don't go throwing away your copy of Tribes 2 just yet, however, as Rob Fung – best known for his involvement in the SWAT series of games – has been named to head a new team dedicated to the continued support of the Tribes games and community. And we all believe that too.

If you feel like letting Sierra know just how displeased you are with its decision to axe Dynamix, head on over to www.petitiononline.com/savedyna/petition.html and join the other 7,800 people by adding your signature.

On a sad day for Linux lovers everywhere, Loki Games – a company famous for porting commercial Windows games such as Quake 3 to the Linux platform – has filed for Chapter 11 bankruptcy protection in the US Bankruptcy Court while it reorganises its debts.

Loki has said that business will continue as usual, with the team continuing to ship orders and develop patches, bug fixes and new products. Hopefully, Loki will be able to sort



out its problems and not continue down the bankruptcy slippery slide into liquidation.

Interplay has announced that it will be dropping the role of publisher after outsourcing publishing and distribution to Vivendi Universal. According to our sources at Interplay, the decision affects only Interplay's North American operations. No other official comment was available at time of print. Speculation is rife as to the reasoning behind the decision, with the most likely scenario thus far being that Interplay is making life difficult for new majority shareholder Titus. Titus currently holds more than a 51% controlling interest in Interplay, but will have to wait until Interplay's next Annual General Meeting before it can make any changes to the current board of directors, thus consolidating its hold on the game industry great. □

WHAT'S HOT

- **GLOBAL WARMING**
It's just too damn cold.
- **STEVE BALLMER**
Best monkey impression. Ever.
- **RDRAM**
It had to be hot one day.
- **AUDIO**
Like music to our ears.
- **CIVILIZATION III**
Sid is back!
- **SERIAL ATA**
Hard drives get some bandwidth.

WHAT'S NOT

- **ICE AGES**
We are still waiting . . .
- **PLANET OF THE APES**
A monkey could do a better job.
- **SDRAM**
Too slow for the Pentium 4.
- **VIDEO**
It just doesn't sound very good.
- **CALL TO POWER SERIES**
Boring knock-offs.
- **SERIAL KILLERS**
Useless for data storage.

The Sydney M337

On a quiet Saturday night in July, several dozen Atomicans gathered for a quiet little soiree. It was warm and lovin' and glorious proof that Atomic is far, far more than a magazine.



Ashok, David & Bertha



Grimey & Mozza



Jamie



Simon & Mathew



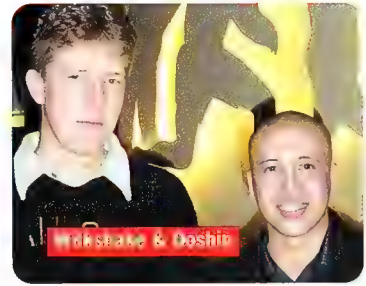
Ron, Doshin & Madeleine



Ben, Grampine & Tonya



Kate & BTM



Winkshake & Doshin



Ben & Vlad



Vanna is always



Ashok & Tim



Liz & Ben



Phat Dixxx & Propriety



Tania Sousa & Chancelor



Mr & Mrs Dudge



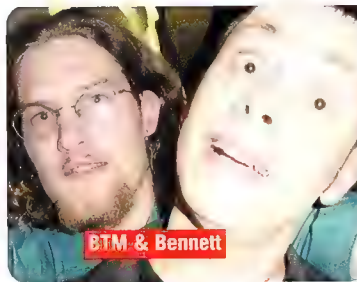
The boys



Evolutioned



Madeleine, Scott & Big X



BTM & Bennett



g_day & Pom

THE MICROSOFT WAY



Ashton Mills takes a swipe at the latest attempt to make money from the Open Source movement.

ASHTON MILLS

With a finger in every pie, it's hard to place Microsoft nowadays, especially when said fingers hypocritically contradict each other.

In a speech earlier this year, Craig Mundie, Microsoft senior vice-president, made a scathing attack against Open Source software and specifically the GNU General Public License (GPL), saying that it is 'viral' and that, ultimately, it's just plain bad for business.

Perhaps Mundie should be reminded that most of the Web's infrastructure, from email transportation to the majority of Web servers, runs on GPL Open Source software. In fact, the Web wouldn't exist if not for Open Source software. The rise and success of its development wouldn't have been possible under a commercial model.

While it's true that Open Source software isn't for everyone (just as commercial software isn't for everyone), it seems that the developmental power of Open Source has finally started to

release any changes made to the code during development of those products. In a word, unlikely.

By contrast, Microsoft's Shared Source plan involves releasing the source code of select Microsoft products, or parts of products, which may be used by developers to learn from only. But they cannot re-use the source code themselves – it's a 'look but don't touch' policy. As one critic put it, this allows Microsoft to take advantage of a much wider development community than it could ever hope to employ – getting their input, suggestions and fixes – without giving anything back to them.

Say you own a company running Microsoft software and find yourself crippled by a bug; you might now at least have access to the source code to find and confirm the bug, but you can only inform Microsoft to fix it, and then wait on a fix – you can't fix it yourself, even if you have the knowledge to do so. Under the GPL, you could, because you always have full access to the source.

While Microsoft has certainly been looking at the advantages of the Open Source

'Under the GPL you have full access to the source code and can do whatever you want with it . . .'

sink in for Microsoft. Mundie revealed in his speech a new innovation [*cough*] – later confirmed in an official announcement – that Microsoft has called 'Shared Source'. Wow, you think at first – if you can't beat 'em, join 'em. But this isn't the Microsoft Way (which is, to be sure, 'embrace and extend'). Despite sounding like a friendly initiative that gives choice and power to Microsoft software users, just as Open Source software does to its users, the truth is not so rosy.

The GPL, under which most Open Source software is licensed – including the entire Linux operating system – was designed to protect the interests of the community, both developers and users. Under the GPL you have full access to the source code and can do whatever you want with it – modify it, add to it, distribute it, create your own programs and make money from it. The GPL stipulates, however, that the source code and any changes made to it must be made available free of charge for others to do the same. That is, you're free to benefit from the work of others as long as you allow others to benefit from yours.

For example, even Microsoft is free to use Open Source software, and all the dedicated man-hours that have gone into it, in its own products. But to do so Microsoft must also

development model and has tried to figure out a way to tap into this resource, it's clear that its Shared Source strategy is in part a tool to combat the GPL and Linux, a competitor that has so far been immune to Microsoft's 'embrace and extend' business practices. After all, this most certainly rings true: if not for Open Source, Microsoft would never have created a concept such as Shared Source.

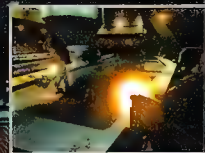
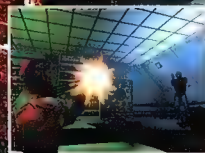
So on the one hand Microsoft is publicly and repeatedly denouncing Open Source software as a Bad Thing™, and on the other proclaiming the benefits of its own perverted form of the concept. After having had a few years to think about it, this is Microsoft's answer to Linux and Open Source. It is, to be sure, embrace and extend.

How will it all pan out? As usual, we'll have to wait and see. In the meantime, head on over to www.shared-source.com for a critical overview of the scheme. □

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THE FUTURE OF 3D GAMING?



Sit yourself down, plug yourself in, turn yourself on, and enjoy the experience. Is this the shape of things to come? Tim Dean wonders.

TIM DEAN

Zuel sits at his PC, transfixed by the scene as it plays out before him and made all the more mesmerising by the fact that he is participating in it. The room is dark. The luminance generated by muzzle flashes from MP5s and AK-47s sporadically lights his face.

Boop-boooop. Unexpectedly breaking the trance is the sound of an incoming ICQ message. Dropping out of the server to receive the message, Zuel notices it is from his pal, Flouncy.

'Z - THEY'RE HERE!!!!' it reads.

'who? and why you shouting?' Zuel taps back. [Send]

Boop-boooop. 'MAN - THEY JUST ROCKED UP IN AN OLD VAN. THEY'RE COMING TO THE DOOR!!!' comes the reply moments later.

Curious. Not like Flouncy to panic about anything.

Tap tap. 'sup man? tell me.' [Send]

Boop-boooop. 'QUICK. COME OVER. HELP ME NOW!!!'

The message raises the hairs on the back of Zuel's neck. He also notices that Flouncy goes offline immediately afterwards.

Zuel races for the door, scooping up his keys as he goes. Minutes later he approaches Flouncy's abode, just in time to see him being dragged into an awaiting black van, which proceeds to speed off down the street.

'WTF?' Zuel asks, as he gasses his car in pursuit.

After a couple of minutes, the van, followed closely by the wheels of Zuel, approaches an industrial area on the edge of the suburbs. Zuel manages to get close enough to see the van enter the front security gates, and race off to one of the far two-storey buildings. In the distance, he can see figures exiting the vehicle, and struggling with a load that they carry inside.

'Far out.'

Zuel leaps from the car, scales the fence (awkwardly), and makes his way across the dark corporate facility.

Inside it is quiet. And dark. And spooky.

Crash. 'Awww . . .' (muffle). *THUD!*

The sound makes Zuel jump. It seems to be coming from a room just down the dark hallway. Cautiously, he makes his way down, his apprehension increasing steadily the further he goes.

Creeping closer, he peeks in through the crack in the door - and has to restrain himself from swearing out aloud.

Inside is like a lab, of sorts, although one vastly different in intent and purpose from the Atomic Labs. Scientific and medial equipment is scattered around the dark corners of the room.

A machine goes *ping*.

At the centre of the room is a metal table with a large light

directly above it, beaming down on the comatose form of Flouncy. Around him stands half-a-dozen men robed in white doctors' gowns and wearing medical masks. Thankfully, none of them notice the peering form of Zuel as he looks on, transfixed.

One of the robed figures is handed a diabolical-looking instrument that looks far too much like an angle grinder.

'No!' thinks Zuel, as the man applies it to Flouncy's forehead, cutting smoothly and evenly around his crown. Thoroughly grossed out, but unable to move, Zuel continues to watch.

When the device spins down, the top of Flouncy's head drops unceremoniously to the floor, and the men collectively begin to remove his brain. Once free, it is placed in a waiting vat of pink liquid, and then plugged into some device using a thick fibre-optic cable.

'Right. Too much for me. I'm outta here,' thinks Zuel. He turns to go, only to collide with a large, burly security guard. Swearing and a futile struggle ensue.

Zuel is dragged into the room. He is confronted by the head scientist, who removes his mask.

'There is no need to struggle. We won't hurt you,' he says.

'Wwwho are you?' manages to stutter Zuel, as the security guard releases his grip.

'You don't know me, but we all know you very well,' the scientist replies.

'What have you done to Flouncy?' Zuel looks towards the brain in the vat, but has to avert his eyes.

'Don't worry, he is quite safe,' says the scientist, taking a step forward. 'All we've done is removed his brain and hooked it up to our new computer system.'

'He is now hooked up to our Phenomenon 3000 system, and is being fed experiences directly into his brain.'

One of the other scientists switches on a nearby monitor. They can see a scene, in first person, of someone walking down a dark hallway and into a bathroom. Zuel is shocked to see reflected in the mirror a drowsy-looking Flouncy scratch his chin and splash water on his face. After a moment, he walks back down the hallway and into his bedroom, where he gets back into bed.

'He just thinks he has had a bad dream. He has no idea he is in there, and he felt no discomfort during the procedure,' says the scientist, with a slight smirk showing a mixture of pride and appreciation of power.

'You fiend! You'll never get away with this!' Zuel is held by the security guard as he desperately tries to flee this scene of horror. 'No! Let me go!'

'I said you had nothing to worry about,' replies the scientist. He approaches the restrained Zuel, flanked by his companions.

'W...what are you going to do to me? Are you going to do that to me?' Zuel asks as they surround him.

'You? Of course not,' replies the scientist, the smirk still on his face.

'We did you last week.'

Awesome game . . .



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FREEDOM OF SPEECH



Dan Rutter discovers what you get if you mix some free Web hosting, blue aluminium and the rings of Saturn.

DAN RUTTER

Freedom of speech is a wonderful thing. So is cheap Web hosting. It allows pretty much anybody with an Internet connection to start their own online publication.

And you really can't complain about the plethora of free PC testing software out there, can you?

Unfortunately, when you put the three together, you get a whole load of PC hardware review sites run by teenagers. Some of these teenagers have their act together. Most don't.

This is not a new phenomenon. Theodore Sturgeon's eponymous law says that 90% of everything is crud. But, in my line of work, this is one flavour of foolishness up against which I am forced to rub.

Consider, for instance, a review of Thermaltake's RAM cooling kit by some guy who shall remain nameless. You may have seen this kit. I cast an eye over it in a review on my Web site a while ago (www.dansdata.com/fastram.htm). It's basically just a couple of heat spreaders and heatsinks, which let you dress up SDRAM to look much like Rambus RDRAM. The kit costs about \$25.

RDRAM needs heat spreaders, because the way it works can concentrate a memory module's entire heat output onto one chip. PC main memory SDRAM does not need any sort of heatsinking, because it's quite low power, and the heat is spread evenly over all of the chips on each module.

Double Data Rate (DDR) SDRAM runs faster than Standard Data Rate (SDR), but at a lower voltage, so it's even cooler. In real-world desktop PC use, you might see a hundred milliwatts of heat coming out of every chip on a DDR module, when the machine's flogging hard. Several hundred RAM chips would be needed to equal the heat output of a high-speed Athlon.

So, anyway, some kid reviews this kit and manages to clock his Athlon machine's PC2100 DDR RAM higher with heat spreaders on it than he could without. He concludes that the kit is a great product. PC2100 RAM is meant to run at 133MHz. He got it up to 161MHz without the spreaders attached. With the spreaders, our hero managed to hit, wait for it, 166MHz. That clock speed difference is a big, fat 3.1%.

Athlon PCs, with their cunning double-FSB architecture, can make use of extra RAM bandwidth better than Pentium III machines can. But the absolute maximum real-world performance gain you're going to see from such a change is definitely going to be below 2%, and probably below 1%, and will very likely be lost in the noise of whatever benchmark you use.

Did this reviewer control for ambient temperature changes?

Heck, no. He didn't even measure the temperature of the RAM, or of the air. And he didn't run any performance benchmarks.

If you want blue-anodised aluminium all over the inside of your computer, then the Thermaltake kit is a cheap way to get some more of the stuff. It's got the same real performance impact as a carbon fibre decal on the side of your car, though.

Some of these comedy review kids are learning on the job, the same way that Arnold Schwarzenegger learned to act. But some others are going to keep on being impressed by statistically insignificant things, and encouraging other people to think the same way, for the rest of their lives.

How about \$750 for a new chip for your car's engine control computer, which the manufacturers assure you will give you more power than the factory tweaked GT version of the same vehicle, but without the trouble of having to install a whole new computer, new cams and new exhaust system? Wow, what a bunch of turkeys General Motors must be to not have figured this out for themselves! Sold!

Wanna buy a book about the Ringmakers of Saturn, explaining that when you see a Voyager 2 picture of Saturn's rings in which some of the rings aren't visible because a bit of the spacecraft was in the way, it actually means that the rings were, at that moment, incomplete? Sure you do! How about \$55 for a bottle of water with a label that reads 'Hardware Alien Below The Plane Of The Ecliptic', and which the sellers claim 'transcends all levels of bodily experience and communication of the "conventional" kind, which is always a political manoeuvre that seeks an advantage for the "self" in the survival of that one as that one'? I'll take it! And give me a bottle of 'Hey! Hey! Core Spider' too!

(I'm not kidding about any of these, by the way. Do a Web search.)

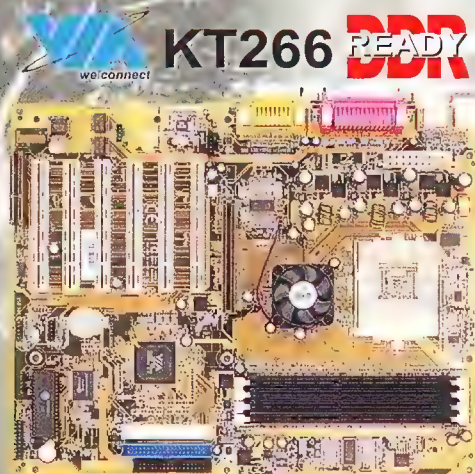
People whose intellect slices through problems with the ease of a car key through frozen butter can be found in all walks of life. As far as computer gear reviews go, though, it's not usually too difficult to spot the, um, Special People, if you pay any sort of attention to the numbers.

Just remember - everybody is entitled to their opinion. But nobody is entitled to be taken seriously.

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Wiggy's green and gold



Technical details

- Pentium III 650MHz
- 256MB RAM
- Prophet II 32MB graphics card
- Creative Sound Blaster Live!
- 15GB ATA/66 hard disk drive
- IBM 12GB Ultra DMA/66 HDD
- 4x/2x/32x CD-R/RW drive
- 6x DVD-ROM drive
- Creative DVD Decoder Card
- 120mm Panaflo fan
- 92mm Panaflo fan
- EL Glowire blue kit
- Blue, moulded HDD cables
- 3mm perspex display window

The story

This is a modified Packard Bell (Yeah, I know. I only kept the case, though!). These Platinum cases are fully modifiable, as they can be completely stripped down. Into this case I have, over time, added components to create a gaming machine capable of handling Counter-Strike at a resolution of 1,280 x 1,024. (Philips 109P 19in monitor!).

I stripped all the panels of the old case and sprayed them using Contessa Gold and Emerald Green metallic auto paint, with a couple

of clear coats for a smooth finish. The side window and top fan hole were cut using a metal and plastic jigsaw. The brass handles topped off the whole look, as well as being useful for lugging to LANs. At night it looks like there's mystic fibre inside the case with the EL Glowire laced throughout the moulded, blue hard drive cables.

The fans keep it nice and chilly. I used rubber washers as shock absorbers for the fans, so you can't even hear a whisper. A chrome grill for the top fan complements the brass handles.

D-Elvis' Kong MP3 box



Technical details

- Pentium III 700MHz @ 466MHz
- 128MB PC133 SDRAM
- Fujitsu 1.7GB hard disk drive
- Seagate 4.3GB hard disk drive
- GeForce2 MX 32MB
- Just Cooler Remote
- Hoontech DSP24 sound card
- Micra PCI 10/100 NIC
- Logitech iTouch keyboard
- Logitech iTouch mouse
- Toy gorilla
- MusicMatch Jukebox
- Winamp
- 900 MP3s

The story

After seeing Matt's 'phluffy MP3 box' in issue 6, one of my mates and I both said the same thing: 'way cool!'. Then we started talking about how we could do it. I could make it truly something I could call my own – I would do it with monkeys!

After finding 'gorilla fur' for \$70 per metre, I walked into Lincraft and found squares of toy fur patches' for \$6 each. Two of these and some glue did the job. I then found a toy chimp for only \$20.

Next, the final challenge. I grabbed all the remaining pieces of fur and proceeded to cut open the chimp with a knife. I made a quick guess about where it would go and glued down the remaining fur, leaving space for the chimp. Now the tricky part. I squirted the last of the glue and jammed the chimp down, trying to use the few seconds I had before the glue dried to get it in place. I did it – it was perfect, but it needed a name . . . a name that suited its status as both a freak and an icon. It would be Kong!

The best Atomic readers' custom cases. Each hot box scores its owner a six-month subscription to Atomic.

Steve's wolf pack



Technical details

- Athlon 1GHz (266MHz)
- A7V133 motherboard
- 512MB RAM
- 8GB hard disk drive
- GeForce2 MX Hercules
- Hercules Game Theater XP
- Diamond Voodoo1 card
- 24x/4x/4x CD-R/RW drive
- Pioneer 6x DVD-ROM drive
- 2-Pak Pearl base coat
- Full tower case
- Black/red marbled paint job
- Custom airbrushed art
- Bullethole-riddled front

The story

This case was airbrushed by Rod Charman at Air Art – he did a great job! Thanks, Rod!

The case was first painted black and coated with Pearl Marbleiser, and the top coat is Candy Apple Red. The effect is such that if you look at the case from different angles, you see either a black or red marble look. You can see this in the photos: parts of the case look black and others red. All the paintwork was done using 2-Pak.

With this project complete, I am now working on the graphic for the next computer I build (I upgrade every 18 months or so). So far it looks like it will be an Australian theme with wicked case mods – maybe based on Ned Kelly or the Eureka Stockade. Or it could be a more techy look, with a carbon-fibre motherboard tray, hidden wiring and customised induction system.

Until whenever my next project eventuates, this case stays as is – you've got to agree that this one is a keeper! □

Access Denied's fluffy cow



Technical details

- Duron 800MHz @ 950MHz
- ASUS A7V133 motherboard
- 256MB PC133 SDRAM
- ASUS TNT2 Ultra Deluxe graphics card
- Creative Sound Blaster Live! sound card
- 32x CD-ROM drive
- 4x/8x/32x CD burner
- 2x DVD-ROM drive
- Four 80mm fans
- Cow pattern fun fur attached with contact adhesive
- Extensive MP3 collection

The story

No cows were harmed in the production of this PC. Four fans have been fitted to the case in addition to the usual PSU, CPU, mobo and video card fans. The reason for this covering? Too much time on my hands.

An added bonus of the covering is that the noise of the fans has been greatly reduced. The main purpose of this PC is to make my audio system sound awesome, as I have a large supply of MP3s.

Now, if anyone has to ask who 'fluffy cow' is at any particular LAN, they need not do more than open their eyes. The only question that remains is, 'What will I do to my next computer?'

Fur was attached using contact adhesive. The fur was applied on a panel-by-panel basis (hence the pattern not matching match as it changes panels). Nothing fancy – just \$40 for materials and about two to three hours of my time. Perhaps the next addition will be a better video card. Spare \$1,000 anyone? □

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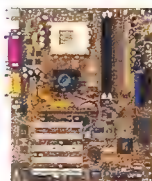
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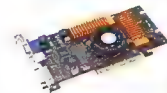
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AMD 1.0GHz Athlon



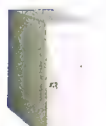
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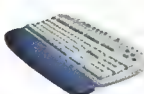
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Microsoft Windows 98 Second Edition



Intel Pentium III 1G



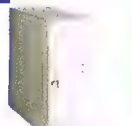
Asus TUSL2-C Motherboard



3D Power GeForce MX200



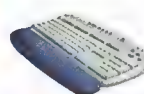
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Bandwidth and how to use it up

Daniel Rutter probes the possibilities of fat pipes.



The first thought that goes through the mind of all right-thinking people when they get a broadband Internet connection is 'How can I use all of this bandwidth, all day long?'

People who are still stuck with dialup modem Internet access care deeply about bandwidth, too, for much the same reason that drowning people care deeply about air.

So how can broadband users stretch the limits of their high-speed link, and what's meanest to a modem? Read on.

Up versus down

When someone talks about a communications link with a given bandwidth – say, 128Kb/s – they're usually referring to a half-duplex connection at that speed. Half-duplex means that data can flow both ways, but not at the same time.

What this means from a user's point of view is that if you download data from a server that can deliver bits faster than the link can pipe them to you, you'll get that data at 128Kb/s, minus whatever overhead that your communications protocols impose.

If you upload data to a similarly speedy server, you'll get the same speed. But if you upload and download at the same time, then you'll only get half as much bandwidth for each task.

This is a 'symmetric' connection; it works at the same speed each way. But most consumer Internet access technology is 'asymmetric', which means the upstream (from you to the ISP) and downstream (from the ISP to you) links run at different speeds.

A '56K' V.90 dialup modem, for instance, will

probably actually connect at some speed between 44 and 52Kb/s, depending on line conditions. But that's only the downstream speed. Upstream you get 33.6Kb/s at most, which is exactly the same ceiling speed as the older V.34bis standard.

This, however, is a full-duplex connection – data flows in both directions at the same time, which means that you can be downloading and uploading at full speed simultaneously.

Cable modem and Asymmetric Digital Subscriber Line (ADSL) connections are also asymmetric; ADSL tells you that right there in its name. These services tend to be 'throttled' by the ISPs, especially in the upstream direction. But even with no artificial bandwidth restrictions, they've still got more downstream speed than upstream. This is fine, for most purposes, as most of the things that most people want to do on the Internet involve receiving a lot more data than you send.

This explains why people can tolerate asymmetric satellite services, which have a dialup modem upstream link and a much faster satellite dish downstream link.

Web browsing

How much bandwidth does Web browsing consume? Good question.

Browse with images turned off and all you'll download from an ordinary Web page is ordinary HTML – we're talking a few tens of kilobytes per page at most, for most sites.

Turn images on and start hitting multimedia-heavy sites, and you can easily fill the pipe connecting you

to the Web server. That might not be a very impressive achievement, though, as multi-hop connections to sites in faraway lands may not leave you with much of a pipe to fill.

Browse sites only a few hops away that are connected to your Internet service provider by big fat pipes – like mirror.aarnet.edu.au, for instance – and you're likely to saturate your Internet connection's entire download bandwidth. If you don't make a special effort, though, you're unlikely to consume much more than 10Mb per hour of ordinary Web surfing.

Games

If you play action games over the Internet, a broadband connection such as ADSL or cable will give you a much better gameplay experience than dialup will. But the difference is due to lower latency as much as it's due to higher bandwidth.

Latency, also referred to as 'lag' or 'ping time', is how long data takes to get from somewhere to somewhere else. For Web browsing, even several seconds of latency isn't hugely annoying. But for action games, particularly first person shooter (FPS) games, every millisecond counts.

Games use all sorts of clever tricks to minimise the amount of data that has to be sent, and to minimise your gaming experience's dependency on other people's data. But when you shoot at someone, or just bump into them in a doorway, decisions must be made.

Some action games, like flight simulators, can get away with really crummy latency and bandwidth. The players don't interact with each other much in a game like this, compared with the face-to-face infighting of a FPS. Plus, everybody generally has limited manoeuvrability, so 'client-side prediction' of other players' behaviour can do a very good job. A Spitfire in a flight sim can do several things, but it can't stop dead from full speed, or instantly spin 180°, as a Quake player can. However, most online multiplayer games don't have these kinds of loopholes.

Even big FPS games, though, need surprisingly little bandwidth. They have to keep their demands low, because most of the FPS market still has a dialup Internet connection. To ensure that dialup participants can still play, the games are tuned to deliver a playable – for sufficiently small values of 'playable' – experience with only about 5KB/s downstream, and about 3KB/s upstream.

However, it's difficult to put an exact figure on the bandwidth a given action game needs. Practically all such games have user-tweakable connection settings, which allow you to tell the game how much bandwidth you reckon you've got. But the network code generally just uses that setting as a ceiling figure, and may actually shift a lot less data around.

On a distant, high-latency server, even with lots of people playing, you may find you're moving little more than one kilobyte per second upstream, and little more than two downstream, on average. On a server run by your ISP with a minuscule ping time, on the other hand, you may average as much as five times that. Generally, you're not likely to move a total of much more than 8KB/s of data, on average.

Less twitchy games are even less demanding.

Massively Multiplayer games such as Ultima Online and EverQuest average less than 1KB/s. Text-based Multi-User Dungeon (MUD) game clients have upstream bandwidth that's almost negligibly small, with downstream bandwidth generally well under 0.5KB/s.

A game's bandwidth requirements may have a low average, but that doesn't mean the flow of data is steady. There can be brief peaks in the data flow of any real-time game, and that's when it's nice to have broadband Internet access. Modern connections can't 'save up' unused bandwidth, and so they'll suffer lag when the peaks come along.

Which, of course, is usually when the pucker factor is high. Lag when you're just running down an uninhabited corridor isn't a problem, but that's not when it's going to happen.

Game servers

Some multiplayer games use a peer-to-peer model, in which there's no particular server machine and every computer talks to every other one, with clever algorithms to make sure only data that a client needs to know gets sent to it. This model doesn't scale well, though. As the number of players rises, the complexity of the network rises exponentially.

If you want dozens of players in an action game, you have to have a central server instead. That's how all FPS games work.

Servers need enough bandwidth to deal with the data going to and from all of their clients. That can add up to a pretty serious pipe, if you want more than a few people to be able to play.

When you see a Counter-Strike server with 32 lunatics traffic-jamming their way around *de_dust*, or, better yet, a Tribes 2 server with 75 people all trying to cram themselves into the pergola-sized flag building on Quagmire, you are not viewing a server that's running on a dialup link.

The (approximately) 16KB/s upload caps on Australian consumer cable modem connections, for instance, will only support three or four players at most. So it doesn't matter much that the user contracts forbid you to run a game server; you couldn't run much of a one anyway.

Big, fat reliable pipes that are suitable for one or more large game servers are quite expensive anywhere in the world, and quite amazingly expensive in Australia. Telstra will fix you up with one of its basic 10Mb/s 'Wideband IP' lines for a bit more than \$20,000 for setup plus more than \$20,000 annually. And it can be lot more if you're not close enough to your nearest CBD.

An alternative to these scarily expensive options for would-be game hosters is to host the game server on your ISP's premises, and administer it remotely. The dedicated server executables for all of the popular FPSes can be run this way; they can be fiddled with from within the game, or via Telnet and FTP, and even HTTP interfaces – like other kinds of Internet servers.

Many dialup ISPs are happy to host a few game servers, because they attract customers. A local server gives dialup users the lowest ping times

⇒

they're ever going to see. And because users playing on an ISP's own servers consume none of the ISP's bandwidth to the rest of the Internet, the cost to the ISP is minimal.

Mods

Game mods can take more bandwidth per player, or less, depending on whether they add more stuff for the servers and clients to keep track of or not.

Counter-Strike, for example, uses a bit less bandwidth per player than plain Half-Life deathmatch, mainly because its 'realistic' weapons don't shoot the streams of slow-moving projectiles that infest most available FPSes.

On the other hand, mods created by 1337 kiddies who think they're the first person to invent a rocket that explodes into 16 grenades that each explode into 24 glowing balls that each shoot out 128 nails that each leave a trail of smoke behind them can require a lot more bandwidth per client.

Streaming media

It's easy to figure out how much bandwidth streaming video can take up – just look at its bit rate. For instance, 64Kb video or audio has, wait for it, exactly a 64Kb/s data rate – that's a bit more than 28MB/h. Of course, 128 or 256Kb streams are proportionally more demanding.

Once again, bottlenecks between you and the video server can reduce the data (per second) you actually get. But if you don't have any such problems, the bandwidth arithmetic is very straightforward.

Internet-based telephony – including video phone software – works the same way, but usually has a low data rate. High-quality corporate videoconferencing systems can suck down 2Mb/s, but that's for a serious \$10,000-plus boardroom installation, not a bunch of USB Webcams connected to Windows boxes running Microsoft NetMeeting. In consumer-gear setups that run over the public Internet, you're likely to have bottleneck problems long before you hit the resolution and frame rate limits of even an entry-level Webcam.

Usenet and email

When you connect to your Internet service provider's Usenet or email server, you're very likely to be able to send and receive data as fast as your connection can handle. With no network hops outside the ISP's own gear, local servers like these are always very fast, assuming they're not loaded down with lots of users.

Not that this matters much for email servers at least, or for ordinary text postings to newsgroups. If you're not sending or receiving enormous attachments, 56K modem bandwidth is fine for email. And text newsgroup message downloads will, even over a modem, still be a great deal faster than you can read.

Simply perusing text newsgroups will, unless you have the speed-reading abilities of Commander Data, require very little bandwidth. It's right down there with text chat, which is unlikely to consume more than 0.5MB/h.

If you're hoovering up big binary postings from Usenet, though, bandwidth matters.

Your, um, copyright-free MP3s of uplifting religious songs and, ah, video clips of fully clothed upstanding citizens doing nothing even slightly naughty, will download spectacularly quickly from a local server, if you've got a good broadband connection.

The MIME64 encoding used for practically all Usenet binary posts adds about a 33% size overhead to everything. But even so, an Optus@Home cable user shouldn't have any trouble dumping more than 300KB/s of decoded data into their download directory.

The Telstra BigPond consumer broadband services currently limit download speed to 512Kb/s; taking overhead into account, that means the fastest newsgroup decoding rate a BigPond cable or DSL customer is going to be able to manage will be about 45KB of decoded data per second.

Sharing connections

By using a proxy server or Network Address Translation (NAT) box of some description, you can share a single Internet connection across a Local Area Network. Windows has had its 'Internet Connection Sharing' NAT software built in since Windows 98 Second Edition was released, and there are many other options. Generally speaking, even ISPs that explicitly forbid Internet sharing by their customers don't care if you do it, as long as you don't end up violating any other data transfer limits they set.

A shared Internet connection simply aggregates the bandwidth needs of all of the client machines. Some sharing software runs a local proxy that can reduce redundant requests from Web browsing clients, but proxies make no difference for games.

Several people playing games through the one connection create the same bandwidth aggregation problems as running a local server, only less so. With a broadband connection with roughly 16KB/s of upstream bandwidth, that's what will limit you. But you still shouldn't have a problem with four or five people playing at once.

Phat URLs

whirlpool.net.au/faq-ab.cfm

The Australian Broadband FAQ, with information about the bandwidth available from different services.

www.analogx.com/contents/download/network/ns1.htm

NetStat Live, which can provide you with more statistics about your Internet connection than you're likely to want to know.

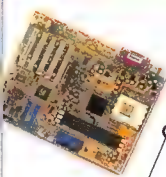
www.hut.fi/~jmunkki/netgames

Design and Implementation of Networked Games, a rather old but nonetheless interesting treatment of what programmers have to do to make multiplayer games work in the real world.

www.gamasutra.com/features/19970905/ng_01.htm

'Designing Fast-Action Games for the Internet' – another classic technical piece on the subject.

You gonna play with this

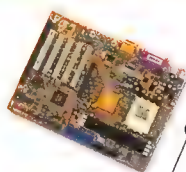


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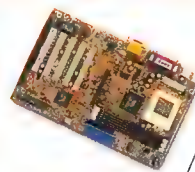


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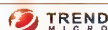


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Tualatin vs. Thunderbird

The Pentium III gets interesting again. John Gillooly sets up a four-way showdown between the new Tualatin Pentium III and the old stalwart Athlon Thunderbird running DDR and SDRAM.

While the Intel publicity machine goes into overdrive over the Pentium 4, especially with the newly launched i845 SDRAM chipset, there is a danger that the Pentium III will fade away into the background. The venerable processor family has been stuck at 1GHz for over a year, after overheating issues forced the 1.13GHz Coppermine version to be recalled in a mess of bad publicity for Intel.

Tualatin is the codename for the 0.13-micron Pentium III processor. This change of process may seem redundant considering the push behind the Pentium 4, but there are several reasons behind it. One of the major reasons is the development of the Mobile Tualatin, which bears perhaps the most clunky processor name of all time – the Mobile Pentium III Processor-M. In mobile computing, heat and power management are king, and the 0.13-micron process makes for cooler, less power-hungry processors, especially when combined with Intel's CPU-throttling technology known as SpeedStep. This is the major reason why we have not yet seen a mobile Pentium 4, Intel is waiting for the die shrink that will accompany the Northwood core before heat management becomes viable. The heat management issues are so great that we have even heard mention of dockable heatsinks being developed by notebook manufacturers to cope with the heat output of the Pentium 4.

The other major reason is that the Tualatin core will become the foundation for the next generation of Celeron CPUs, which should drag the once revered processor family out from behind the faster (and cheaper) offerings from AMD. The major issue with this is that it is still unclear as to the performance levels of the soon-to-be released next-generation core for the AMD Duron, codenamed Morgan.

There are few differences between the Tualatin and the Coppermine Pentium III processors. Apart from the die shrink, the only other major difference is that the Tualatin contains Data Prefetch Logic, which is similar to the Hardware prefetch used by the Pentium 4. It is a technique for predicting what data will be used next and then pre-loading it into the cache of the processor. The mobile Pentium III-M also has an increased L2 cache, but this is not present on the desktop model. One of the major changes is that the processor now includes an integrated heat spreader like the Pentium 4. This will stop you from ever cracking the fragile core of the CPU (unless you throw it into a steel press or whack it a few times with a sledgehammer). The downside of the heat spreader is that it changes the height at which the top of the CPU sits when mounted on the motherboard. This means

that upgraders will not be able to use their current Pentium III heatsinks on the Tualatin processors, but it may mean that lapping the CPUs and new heatsinks will become fashionable again.

In its current form the desktop Tualatin Pentium III will have a very short lifespan as the Pentium 4 takes over the mantle of Alpha male in the Intel processor product family.

The 1.2GHz Tualatin is being marketed under the Pentium III moniker. To avoid confusion with the recalled 1.13GHz Coppermine processor, the 1.13GHz Tualatin is known as the Pentium III 1.13GHz A – nice and simple. As a rule of thumb, if a Pentium III CPU has a heat spreader, then it is using the Tualatin core.

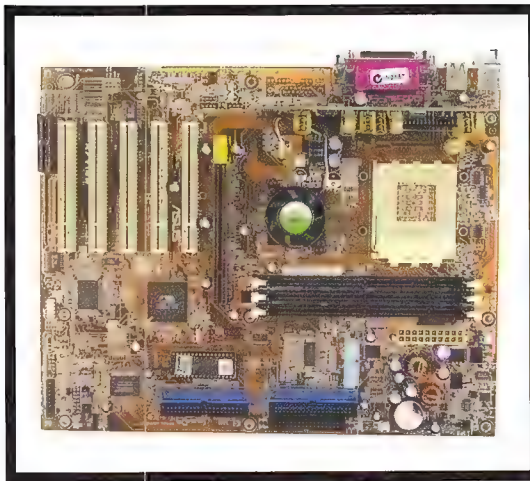
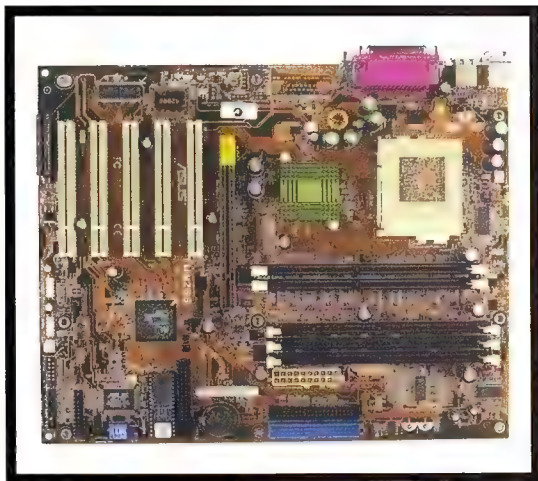
Existing Pentium III chipsets will not handle the Tualatin CPUs, and most chipset manufacturers have released revised chipsets to deal with the CPU. We have used two ASUS motherboards to test the CPU. The TUSL2-C, which is based on the widely used CUSL2 motherboard and uses the newer B-Stepping version of the Intel 815EP chipset. The other board is the TUA266, a dual SDRAM/DDR motherboard based on the ALi ALADDiN-Pro 5T chipset. Also available are boards based on new revisions of VIA's Apollo Pro chipsets, the Apollo Pro266T and the Apollo Pro 133T.

In the other corner

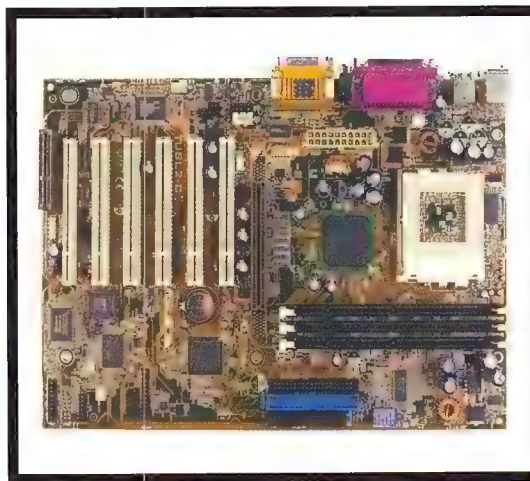
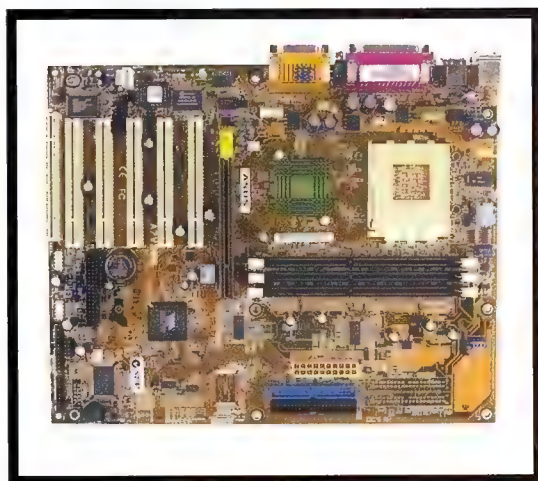
The major competitor to the Tualatin is still the Athlon Thunderbird. We lined a 1.2GHz Tualatin processor up against a 1.2GHz Athlon. Both processors use a 133MHz FSB, and we have tested them with both DDR and SDRAM configurations. For the Athlon we used the two most recent in the A7V families, the A7V133 SDRAM board and its big brother, the newly released A7V266 DDR board. This board uses the VIA KT266 chipset. In each case we have used 128MB of RAM for testing.

For the first time we are using the SYSmark2001 applications benchmark. This benchmark was developed by 3DMark creators MadOnion.com (www.madonion.com) and the industry group BAPCo. This benchmark is designed as the next generation of application-based benchmarks and is based on supposed 'real world' work patterns. Rather than running a series of applications in sequence, SYSmark emulates a multitasking environment, switching between several open applications in order to emulate Internet content creation and business activity. We have also tested using 3DMark2000 Pro at low resolution and Quake 3: Arena at low resolution/high geometry settings.

The TUA266 (\$220) and TUSL2-C (\$250) motherboards were supplied by Achieva www.achieva.com.au. The A7V133 (\$299) and A7V266 (\$359) motherboards were supplied by CASSA www.cassa.com.au.



LEFT: The ASUS TUA266 motherboard
RIGHT: The ASUS A7V133 motherboard.



LEFT: The ASUS A7V266 motherboard.
RIGHT: The ASUS TUSL2-C motherboard.

“... the maturing DDR controller used on the A7V266 helped it to beat the Tualatin DDR system by 5%.”

The results

Intel is a member of BAPCo and is also pushing SYSmark2001 as its application benchmark of choice. Despite this, we have found that the results scale well across different processors and RAM configurations. In our tests there was a negligible performance difference between the SDRAM and DDR Tualatin systems, which was only in the order of 3%. The big surprise was the relatively low performance of the SDRAM Thunderbird, which lagged behind the SDRAM Tualatin by almost 20%. On the other hand, the maturing DDR controller used on the A7V266 helped it to beat the Tualatin DDR system by 5% in the overall SYSmark2001 benchmark result.

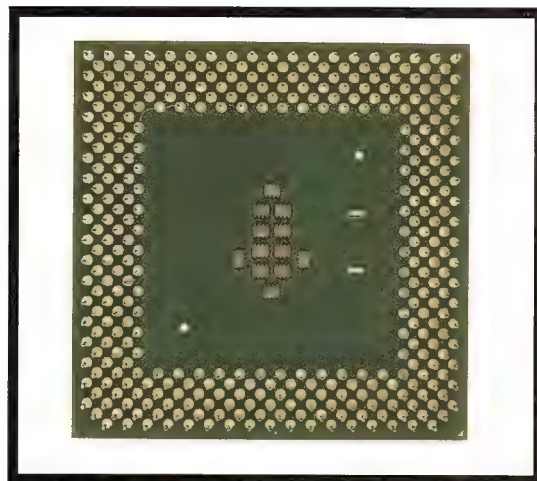
When looking at the two components of the SYSmark2001 tests, the most pronounced differences occurred in the graphics- and video-intensive Internet Content Creation section, with the SDRAM Athlon lagging behind significantly and the DDR Athlon sitting neck-and-neck with the Tualatin

systems. In the calculation-intensive Office Productivity tests the DDR Athlon sat well ahead of all the other processors, and the gap between the SDRAM Athlon and the Tualatins is much less pronounced

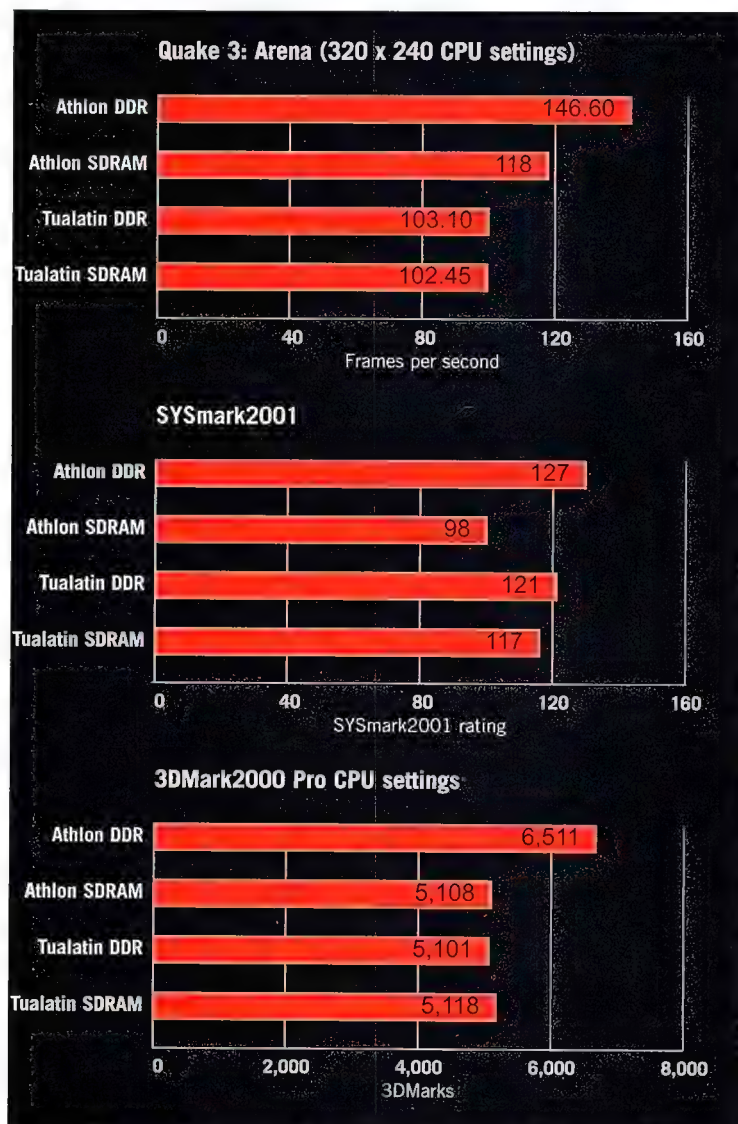
In Quake 3 the advantage of the DDR controller used in the A7V266 starts to become apparent. Using SDRAM, the Athlon manages a 14% lead over the DDR Tualatin, but the DDR Athlon is a whopping 42% faster than the DDR Tualatin. The difference between the Athlon and Pentium III is not surprising considering that the 133MHz FSB Athlons can give higher clocked Pentium 4 processors a run for their money. However, until now, the difference between SDRAM and DDR for the Athlons has been disappointingly small.

The same trend continues in the low-detail 3DMark2000 tests. There is a negligible difference between the Tualatin using DDR RAM, the Tualatin with SDRAM and the Athlon with SDRAM; however, the Athlon leaps ahead to an almost ridiculous lead in performance when using DDR RAM. ➤

① The Tualatin CPU is dominated by the large heat spreader used to protect the core and enhance heat transfer.



'For those who are not gaming fanatics or number-crunching freaks, the Tualatin is a very viable choice . . .'



DDR no longer sucks?

From our testing it is clear that the big winner is the VIA DDR controller. It remains to be seen whether or not this sort of performance boost would occur if it was used for a Tualatin mainboard, but for the bandwidth-hungry Athlon it finally provides the increased memory performance to the level of the previous market leader, AMD's 760 chipset.

The Athlon still seems to have the edge in floating-point performance, which pushes it ahead of the Tualatin in FPU-intensive applications. That said, the Tualatin is no slouch, managing to keep up with the Athlon and just being pipped by the superior memory bandwidth offered by the KT266 chipset.

Like previous Pentium III DDR chipsets (in fact, like most dual DDR/SDRAM motherboards Atomic has seen), the ALi ALADDiN-Pro 5T still does not provide a noticeable performance boost. Even though the Tualatin can keep up with the SDRAM-powered Athlon, the timing of the processor's release means that it will be pipped at the post by the final maturing of Athlon DDR platforms.

For those who are not gaming fanatics or number-crunching freaks, the Tualatin is a very viable choice for computer systems, at a reasonable price. The major problem will be that Intel has shifted the focus of its marketing for desktop processors firmly towards the Pentium 4. With the release of the i845 chipset this month, and the introduction of DDR chipsets for the Pentium 4, the overall upgrade price should fall significantly.

The Tualatin is a small step, but a significant one. The mainstream desktop market is unfortunately not the place in which this processor will shine. However, the benefits of this chip mean that it should become a long-term player in the mobile market. Down the track, the potential of the Tualatin Celerons remain uncertain, especially in light of the upcoming release of the next-generation Morgan core for AMD's Duron range of processors.

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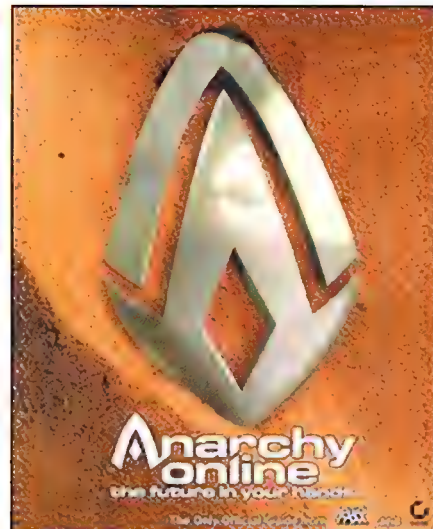
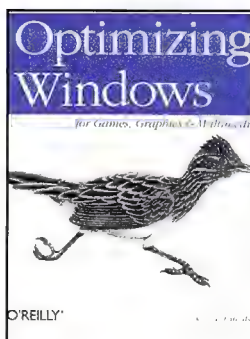
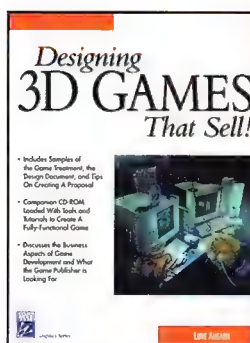
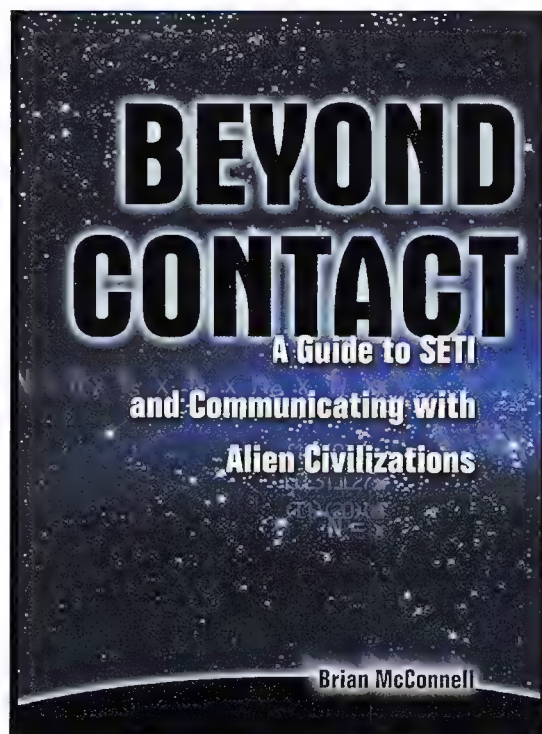
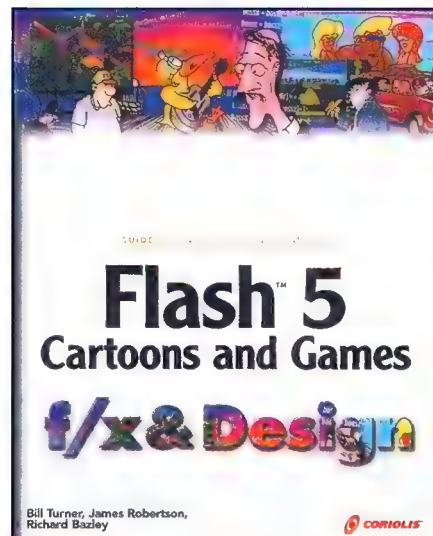
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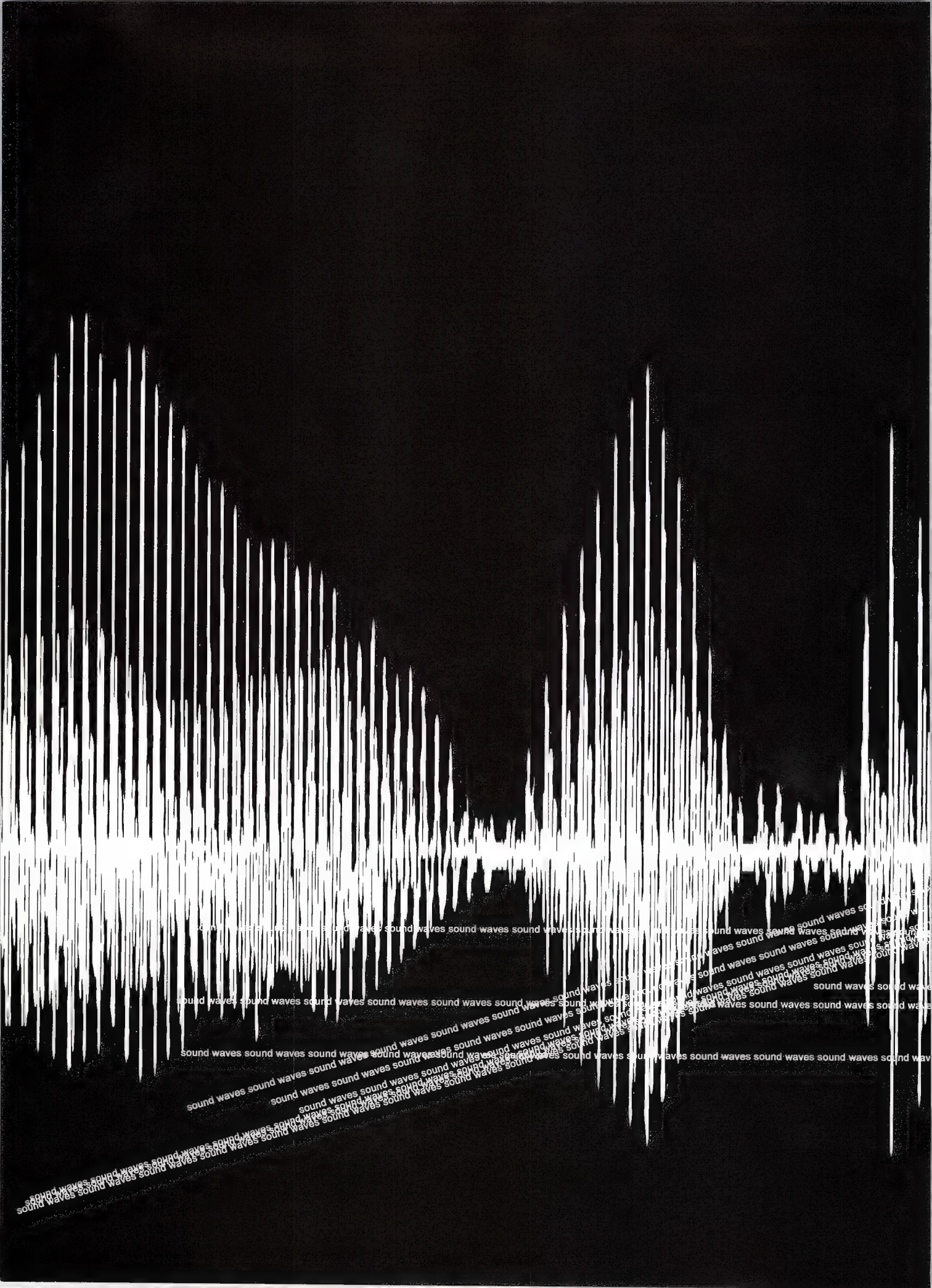
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The speed of sound

Bennett Ring presents a sound card round-up with a difference.

There is one factor that most sound card reviews tend to overlook; a factor that is high on the list of priorities of most Atomicians. Performance. We're not talking performance as in sound quality – that's for all the namby pamby audiophiles to get constipated over. Nope, we're talking raw frame rates and CPU loads. You want it, you need it, you'll pay anything to get it. Most people don't even realise that the sound card they choose can have a significant impact on their system's performance.

How we tested

We strapped 15 sound cards into our 1GHz Pentium III testbench on a CUSL2 motherboard, consistently thrashed them to within an inch of their silicon lives, and then checked out how much they caused the PC to squeal in pain. To test CPU utilisation synthetically, we used the Ziff Davis Media Audio WinBench 99 test with 32 voices at 44.1kHz/16-bit quality being pumped through the sound system.

Remember the game Unreal Tournament (UT)? Judging by the gamut of empty servers on the Net, not many do, but it makes a great test for the frames per second (fps) hit that some cards incur, as it has full EAX and A3D support. The UT city intro was looped, with all graphical details at their lowest with a resolution of 320 x 200, while 3D sound at high quality was enabled. Quake 3: Arena was also run, but due to the fact that it only supports A3D and most cards don't use this API, the results were so close that they were useless.

Sound quality wasn't totally ignored, but let's face it: for the average PC user/gamer the majority of sound cards output a signal that sounds just as clean and crisp as the rest. In fact, there were only a couple of cards that were noticeably clearer or worse than the rest. So we ran the subjective audio tests within the Media Audio WinBench 99 program, and each card was given a score out of ten, based on the results.

All cards were tested with a quadrophonic (four satellites with sub) speaker setup, even though many of the cards support 5.1 speaker setups. This was to prevent those that could only run with four speakers from having a performance advantage over those that could run with the full 5.1 setup. Finally, we gave each card's overall package (supported APIs, 5.1 support, included software, I/O ports, cables) a score out of ten.

While the variation in performance wasn't as huge as, say, a video card round-up, there was still a 10% difference between the fastest and slowest cards. Small differences like this aren't really noticeable on their own, but in a speedy system these differences, when combined with various other tweaks, add up to make that machine faster than the rest.

TerraTec DMX XFire 1024

Price: \$199

Sound quality: 7

Package features: 3

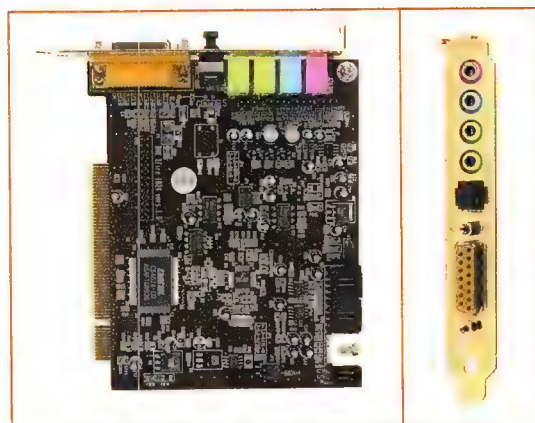
Compared to the competition, the TerraTec DMX XFire 1024 doesn't ship with many extras. There are no crappy three-year-old games or amateurish sound applications to help fill out the ridiculously oversized boxes most sound cards arrive in. At the low price of \$199, what did you expect? As far as we're concerned, the less cost-raising stuffing included with each sound card, the better. So the DMX XFire 1024 gets the thumbs up in this regard.

The DMX XFire 1024 is also one of the few cards that does not support analog 5.1 speaker output. However, the optical digital out means those of you with external decoders will still be able to play the 5.1 Dolby Digital AC3 format. But if you're like most people in consumer land and you don't have a decoder, you're going to be limited to a maximum of four speakers.

Using the Crystal CS4624 DSP, the XFire 1024 primarily uses Sensaura 3D for positional sound effects, but is also compatible with A3D, and EAX 1.0 and 2.0. The card outputs via one S/PDIF and two 3.5mm stereo line-outs. It has a 3.5mm stereo input, a microphone input, two onboard CD inputs, an auxiliary onboard input as well as an onboard digital input, for, err, inputting stuff.

While the sound quality was just as good as the majority of the pack, the performance levels weren't quite so impressive. In fact, it tested as the slowest in both the Unreal Tournament and WinBench 99 tests, with a frame rate of 84fps in UT and a CPU utilisation of almost 14%.

For this reason, Atomic cannot recommend this card for those users who demand the fastest frame rates.



TerraTec
DMX XFire 1024

Hoontech 4D-Wave NX**Price:** \$119**Sound quality:** 6**Package features:** 3

This card is one of the few Hoontech offerings that is primarily aimed at the home PC user/gamer. At \$120 it's also one of the cheapest Hoontech cards to be found.

As such it comes in a bare-bones package, with a single installation CD and a very brief manual. Two 3.5mm stereo outputs provide full quadrophonic support, while the standard inputs for microphones and stereo-in are included on the back of the card. Needless to say, fans of 5.1 won't find this card suitable for their needs.

This card uses QSound to provide positional audio. The sound quality was surprisingly poor for a Hoontech card, with a noticeable hiss at higher volume levels. As we said previously, unless you're buying an AMD product, you pay for what you get.

However, if all you are interested in is the ultimate in frame rates, this card is literally a screamer. It took out top spot in our Unreal Tournament test with 92fps. Surprisingly, it had one of the higher CPU utilisations of 4.05% within our WinBench 99 audio tests.

While the card is priced at a low \$119, its lack of features prevents us from recommending it regardless of its excellent UT performance.

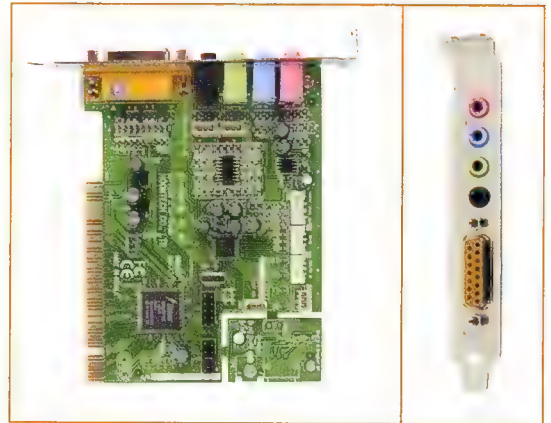
AOpen AW744-L**Price :** \$72**Sound quality:** 7**Package features:** 3

The AW744-L uses the Yamaha YMF744 sound chipset, which is one of the simpler chips among the sound cards tested. As a result, this card has no support for EAX or A3D; instead, it uses the increasingly popular Sensaura 3D and DirectSound APIs, and at only \$72 is one of the cheaper cards reviewed.

For that price, you can't expect the extensive input and output options present on many of the other cards. So you'll have to make do with the front and rear 3.5mm stereo outputs, which are the only output options for this card. Likewise, the input options are limited, with a 3.5mm microphone and auxiliary input on the rear of the card as well as a single CD-in, an auxiliary 4-pin and a telephone answering device (TAD) input onboard the card.

Compared to most of the sound cards, the AW744-L ships with a very sparse software package – only one CD worth of drivers and applications. Fortunately, the card's sound quality is more than acceptable. It provides a clear, crisp sound that is equal to the majority of the sound cards tested.

If you can handle a slight frame rate hit, then you won't mind that this



Hoontech 4D-Wave NX

card incurred one of the more significant performance decreases. Its score of 86fps was one of the lowest UT scores, while the CPU utilisation in WinBench 99 was a respectable 3.1%.

If value for money is your main priority, the AOpen AW744-L is one of the cheapest quadrophonic sound cards around, but the lack of EAX and A3D support might hold many back from purchasing this card.

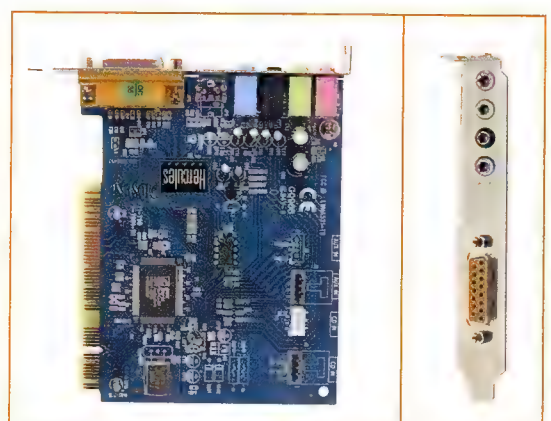
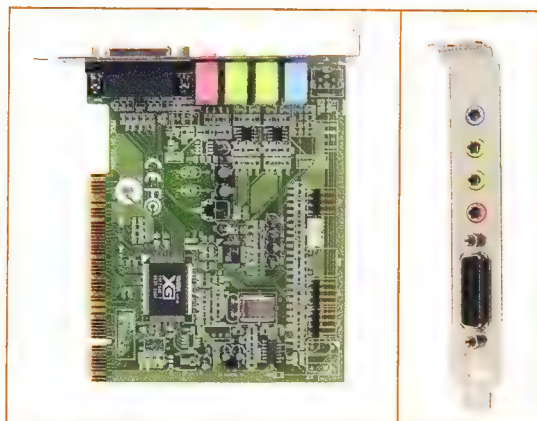
Hercules Gamesurround Muse XL**Price:** \$80**Sound quality:** 7**Package features:** 3

Hercules has built a strong reputation over the last few years as a company that can compete with the best of them, be it the manufacture of sound cards or video cards. Its Gamesurround Muse XL is a great example of why. At \$80, it's amazing that this card sounds just as good as some of the \$300-plus cards when it comes to gaming.

In terms of inputs, this card is one of the simpler ones. It has a 3.5mm stereo, a 3.5mm microphone and two onboard 4-pin inputs for CD and auxiliary inputs. Both the rear and front channel outputs are standard 3.5mm stereo connectors, so if you happen to have an external Dolby decoder with a 5.1 speaker setup, you'll have to look elsewhere.

This card performs reasonably well, being only

LEFT: AOpen AW744-L
RIGHT: Hercules Gamesurround Muse XL



5fps behind the fastest cards. Its CPU utilisation of only 3.44% shows that it can handle most of the load involved in providing 32 voices, without having to go knocking on the CPU's door to borrow processing cycles.

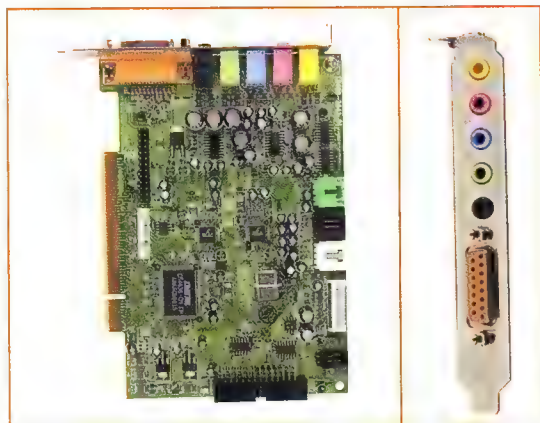
Like many of the cheaper cards, the Gamesurround Muse XL uses Sensaura technology to provide 3D positional audio, provided by the C-Media CMI-8738 sound chip. But just because it's compatible with A3D 1.0, EAX 1.0/2.0 and DirectSound doesn't mean that it will sound like a true A3D or EAX card. Whether or not Sensaura sounds as good as EAX or A3D is a matter of personal taste, but the opinion in the Atomic offices is a consistent no. But we're split down the middle about whether or not we like EAX or A3D (note to John Gillooly: A3D is dead, man – get over it!).

At such a low price, this card performs admirably. But for those who want a card that can be used for more than just playing games, the technology on offer and the limited options probably won't suffice.

The sound quality is noticeably better than many of the cards in the round-up, while its UT performance was squarely in the middle of the field. However, its ability to handle all 32 voices in the WinBench 99 test onboard the chip means it had one of the lowest CPU utilisations, with an impressively low usage of 1.57%.

This card is yet another to use the Sensaura 3D API, which converts A3D 1.0 and EAX 1.0/2.0 to use the Sensaura effects. Not all games will run correctly with this feature enabled, in which case you'll have to use the card's DirectSound support. This could be a bit of a turn-off for some, especially considering the widespread use of EAX within most new releases.

If you expect to get all of this at a price lower than \$200, you're kidding yourself. You pay for what you get, and this is reflected in the \$249 price tag. If you can live with the Sensaura technology, this card will serve you well for both gaming and DVD when using a 5.1 or quadrophonic speaker setup.



Video Logic Sonic Fury

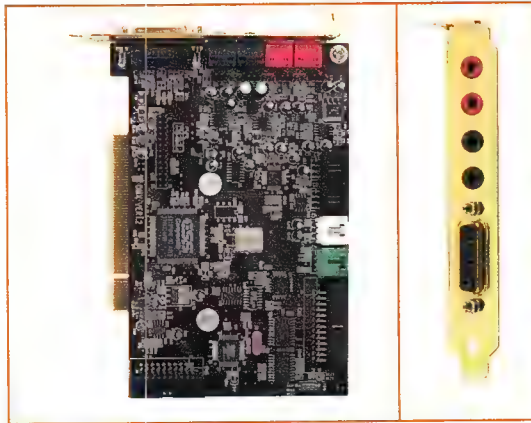
Price: \$245

Sound quality: 8

Package features: 7

Other than the packaging and software that this card ships with, it is for all intents and purposes identical to the Turtle Beach Santa Cruz sound card. As such it uses the Crystal Audio CS4630 sound chip to provide full 5.1 analog output, making the need for an external digital decoder unnecessary. But if you do happen to have a digital decoder handy, the VersaJack output on the card – which would usually handle the centre speaker/sub line – also doubles as a digital out, allowing you to utilise a digital output. The versatility that comes with providing both analog and digital 5.1 outputs makes the card great for those with a 5.1 speaker setup and who plan to get an external digital decoder at a later date.

Other than the VersaJack, this card has the usual front and rear stereo outputs, as well as a microphone and auxiliary stereo input on the back of the card. It also has the usual TAD in/out, CD in and aux input mounted onboard the card, alongside a digital CD input.



TerraTec DMX

Price: \$349

Sound quality: 8

Package features: 7

TerraTec is usually associated with professional-level sound cards, and the DMX wears this heritage proudly on its sleeve. If you want inputs and outputs, you won't find many cards that have more than this beast. It actually has an additional I/O board just to fit them all! At the rear of the card are the usual front and rear 3.5mm stereo outputs, as well as 3.5mm stereo and microphone inputs. Onboard the card, a massive four 4-pin inputs reside for all your audio inputting needs. The I/O card contains two additional digital outputs and another two digital inputs. Unfortunately, the DMX doesn't provide the option to directly attach a set of 5.1 speakers without using an external decoder. And for the price, this is nearly unforgivable.

The makers claim that this sound card has one of the clearest levels of sound recording and output than similarly priced cards, and we can confirm that the DMX does have a noticeably clearer output when used for gaming or viewing DVDs. This card uses Sensaura 3D to provide positional audio. Performance levels were more than adequate, with a score of 89fps in Unreal Tournament, and a CPU utilisation score of 1.89% in the WinBench 99 test.

Though it claims to be a gamer's card, the DMX is more suitable for the professional audiophile than your average frag head.

LEFT: Video Logic Sonic Fury
RIGHT: TerraTec DMX



Hercules Gamesurround Fortissimo II

Price: \$129

Sound quality: 7

Package features: 6

This card uses a unique splitter cable to provide the usual speaker outputs. Attached to a single proprietary 9-pin PS/2-like connector, the splitter provides three 3.5mm stereo outputs: one for the front channel, one for the rear and the third for headphones. Initially we assumed that the headphone output could also be used for the centre/sub output, but soon discovered that it could only be used for headphone support.

While this means you can't hook up a set of 5.1 speakers directly to the sound card, it's a handy feature to have, as most sound cards use the front speaker output for headphones. As a result you won't have to go fumbling around the back of your PC at night when headphones are necessary to stop you waking the neighbours with the howls of your desiccated enemies.

For such a low-priced card, it's also surprising to see that it has both a rear optical digital input and optical digital output. If you already have an external digital 5.1 decoder, this card is one of the cheapest around that can handle it.

The sound quality of this card was neither amazingly impressive, nor woefully distorted. It provides a crisp, clear sound through a wide range of frequencies and volumes.

A Cirrus Logic SoundFusion CS4624 chip is the piece of silicon that does all the work on this card, and is yet another of the cheaper cards to use Sensaura 3D technology to supply positional audio. As with all cards that use the Sensaura technology, it's a matter of personal taste as to whether this is a positive or negative thing.

In terms of performance, this card came out in the middle of the pack for UT performance at 88fps. For such a cheap card it had an amazingly low CPU utilisation of 1.93% in the WinBench 99 test, beating many of the newer, higher priced cards.

If price is a concern for you, and you don't need direct analog 5.1 output from your card, the Gamesurround Fortissimo II might have what it takes to tempt you out of \$130.

Creative Sound Blaster Live! Platinum 5.1

Price: \$399

Sound quality: 8

Package features: 9

If the AOpen AW200 is the definition of the ultimate budget gamer's sound card, the Creative Sound Blaster Live! Platinum 5.1 could be defined as the ultimate high-end gamer's sound package. And at over ten times the cost of the AW200, it's no surprise that this package is packed to the brim with extras.

Where most packages include a couple of five-year-old games, the Platinum pack includes such classics as Deus Ex and Thief II, and this quality of presentation carries on through the rest of the pack.

The number of inputs and outputs that this card has are too numerous to mention, with the majority of these mounted on an external I/O Live! Drive, which fits into an empty drive bay. This brilliant device allows you to hook up the majority of your audio devices, as well as headphones, to the front of your PC, removing the need to go near the cluttered mess of cables that the rear of most PCs resemble.

You won't need to use an external Dolby decoder to output to a 5.1 speaker setup, as this card includes analog outputs for both front and rear channels, as well as another output for the centre/sub speaker. Also included is a remote control that uses an IR port on the Live! Drive to control DVD, CD and general audio settings.

Just like every other Live! card on the market, the Platinum uses the EMU10K1 sound chip to process the audio. As a result, its performance figures were almost identical to the rest of the Live! cards. Its score of 91fps in Unreal Tournament, with true EAX support enabled, demonstrates that this chip is certainly one of the top performers. Similarly, its CPU utilisation of a meagre 2.12% shows that this chip can handle 32 audio voices with ease.

If the price isn't too much of a deterrent and you're after a truly EAX-compatible sound card, you can't go wrong with this impressive, albeit ageing, piece of kit.

AOpen Audio Phantom AW200

Price: \$35

Sound quality: 2

Package features: 2

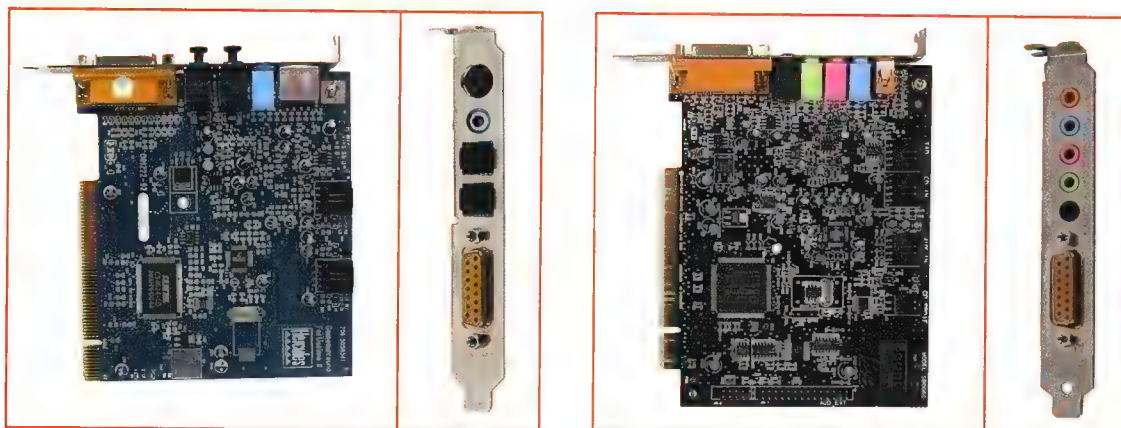
At a meagre \$35, this is easily the cheapest sound card in the round-up. And, boy, does it show. Arriving in a package only slightly thicker than the actual sound card itself, with the briefest of manuals and one CD, this sound card simply reeks of being a budget item.

This probably explains why this card has the worst sound quality of all those tested. This was particularly noticeable in the WinBench subjective 3D quality tests where a smooth transition between each speaker is

LEFT:

Hercules
Gamesurround
Fortissimo II

RIGHT: Sound
Blaster Live!
Platinum 5.1

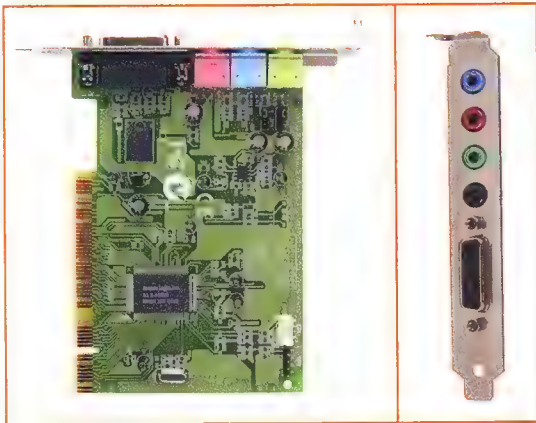


desirable. This sound card has very sharp transitions between the front and rear channels. The undesirable hiss at high volume levels that many sound cards suffered from in the past is also present in this sound card.

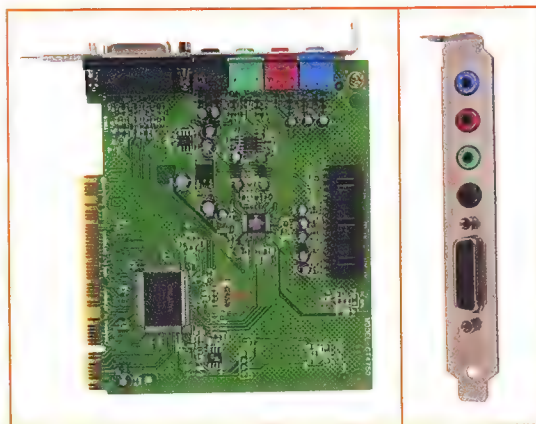
Thankfully, the AW200 does support a quadrophonic speaker setup, with both a front and rear 3.5mm stereo output. There is a single stereo input as opposed to the usual two found on most sound cards, and only two four-pin CD/AUX inputs onboard the card.

The AW200 uses the exceedingly cheap AOpen AS9200 chip for its audio processing, which looks as if it's quite capable of handling most of the processing load, although this is at a noticeably reduced sound quality to all of the other cards. This card recorded a WinBench CPU utilisation score of 3.03% and a very respectable 89fps in the Unreal Tournament test.

Regardless of its capable performance scores, the relatively poor sound quality makes this card acceptable only for those with less than \$40 to spend on a sound card. In which case, they probably shouldn't even be tinkering with their expensive PC as a passtime. Instead, they should take up stamp collecting, but this probably won't supply the adrenaline rush a good head shot can provide.



AOpen Audio Phantom AW200



Creative Sound Blaster PCI 128 Digital

Creative Sound Blaster PCI 128 Digital

Price: \$99

Sound quality: 5

Package features: 3

Unlike most of the Creative cards on the market, the PCI 128 Digital doesn't use the venerable EMU10K1 chip to decode your PC's audio. Instead it uses the slightly older, and definitely inferior, CT5880-DBQ chip. Consequently, it's nowhere near as feature-rich as the Live! series of cards. This probably accounts for the very low price, although if you can get hold of OEM equipment you could probably find a Sound Blaster Live! Value for a smidge more.

Don't let the word 'digital' in its product name fool you; this thing has about as many digital features as an aardvark, with not a single digital input or output to be seen. You've just gotta love thee devious chaps who inhabit the marketing department of component manufacturers.

Without digital inputs or outputs, you'll have to make do with the 3.5mm stereo and 3.5mm microphone inputs on the back of the card, or one of the three 4-pin onboard connectors to take care of your inputs.

Four-speaker support via a front and rear stereo output will enable you take advantage of a quadrophonic speaker setup. And even though this card supports four speakers, it is lacking the true EAX support that most Creative cards are held in high regard for. This is quite surprising considering how heavily Creative pushes EAX, even though it is just a budget card.

Microsoft's widely used DirectSound API is the only sound API supported, and while it provides positional audio it doesn't have any of the reverb or occlusion effects of EAX.

This card performed very well in our Unreal Tournament test, with a score of 91fps. But this is probably due to the lack of EAX effects. Unfortunately, its CPU utilisation of 4.54% was one of the worst in the round-up, but this small amount probably won't be noticeable to those with high-end processors.

It must be noted that the sound quality of this sound card was definitely inferior to most of the other cards. In particular, there was a notable hiss even at lower volume settings. Not a good thing. You've probably figured this out already, but for the price there are better options available for the budget-conscious buyer.

Contacts

If any of the cards in the round-up have created such a warm feeling in your loins that you can't live without it, you'll be able to find it at one of the following companies that kindly supplied the cards to Atomic:

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Hercules SC-Core 6 Digital and SC-Riser 6 CNR

SC-Core 6 Digital**Price:** \$129**Sound quality:** 7**Package features:** 2**SC-Riser 6****Price:** \$79**Sound quality:** N/A**Package features:** 2

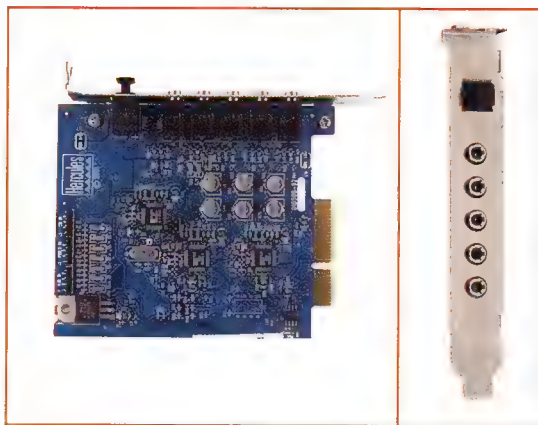
Most motherboards with Intel chipsets that were released after the middle of last year feature a slot that looks like the poorer cousin of an AGP slot, nestled in among the PCI slots. This mysterious slot is known as a Communication and Network Riser (CNR), and was developed by Intel to provide hardware manufacturers with an even cheaper way of providing networking and audio than PCI cards. Hercules is the latest company to utilise this slot to provide a cheap OEM audio solution.

Because this component is targeted at the OEM sector, you won't find it in the retail channels. But any PC builder worth their salt will usually have a list of OEM providers longer than their arm, so this shouldn't be a problem for those who are determined to use one of these products.

It must be noted that these aren't the final names of the products; rather, they are codenames until Hercules decides on something a little catchier than 'SC-Core 6 Digital'.

The SC-Riser 6 doesn't actually act as a sound card; instead it provides additional rear and centre/sub channels for motherboards with integrated stereo sound. So if your motherboard doesn't already have integrated stereo sound using an Intel Southbridge, then this riser is

LEFT:
Hercules SC-
Core 6 Digital
RIGHT: Sound
Blaster Live!
Value



useless to you. But if you happen to have this type of integrated sound, the SC-Riser 6 can provide you with full analog 5.1 speaker support for under \$80.

The SC-Core 6 Digital CNR card is a more full-featured CNR card than the SC-Riser 6. It provides full 5.1 analog output, but still requires one of the following Intel Southbridges to function: ICH 82801AA, ICH0 82801AB, ICH2 82801BA or an ICH3 82801CA. It also includes an optical digital output, in case you have an external decoder at hand.

We didn't test the SC-Riser 6, as the motherboard we used did not have any onboard audio outputs. However, we did whack the SC-Core 6 Digital card into our CNR slot on the ASUS CUSL2 to check out what this card was capable of. For the price, this card provides excellent sound quality, although not quite as good as some of the better cards in the round-up. Its performance figures weren't quite as impressive, with a relatively low Unreal Tournament frame rate of 86fps. Its CPU utilisation figures were quite dismal, using 9.52% while under the load of 32 voices, but this probably won't be quite so noticeable for those with higher speed processors.

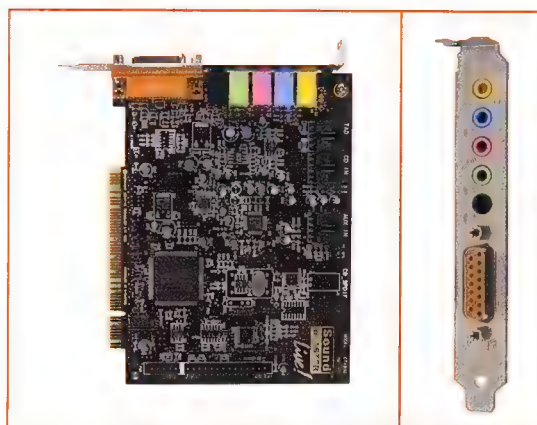
The fact that these require an Intel chipset to run will make them unsuitable for many, but if you do have the required hardware there isn't a cheaper option for 5.1 support.

Creative Sound Blaster Live! Value**Price:** \$120**Sound quality:** 7**Package features:** 3

If you were to ask the techies in the Atomic offices which sound card they'd recommend for the average gamer on a tight budget, you'll most likely hear the answer 'Sound Blaster Live! Value'. For good reason too. These cards have built up a reputation over the last couple of years as *the* budget card to beat.

At only \$140, this card still manages to pack the powerful EMU10K audio processor of its higher priced brethren. And as we all know, this is a lovely little piece of silicon. With full hardware support for EAX 1.0 and 2.0, aficionados of the EAX format won't find a cheaper EAX solution.

As far as inputs and outputs go, this card has the standard range. There are two 3.5mm stereo outputs for the front and rear channels, as well as a microphone and a stereo input. Noteworthy for such a cheap card is the 3.5mm digital output present, making this card fully capable of supplying a 5.1 signal to an external decoder. Unfortunately, the lack



of an onboard decoder makes the use of an external decoder essential to get 5.1 support, but at this price it's not surprising.

Creative have always harped on about how the EMU10K is such a powerful audio processor, and our results confirm this. Due to their similar construction, all of the Live! cards performed similarly, and even the budget Value model managed to keep up with the more expensive Live! cards.

The Unreal Tournament score of 91fps is second only to the Hoontech 4D-Wave NX, but was delivered at a much higher sound quality. Likewise, the CPU utilisation of 1.92% was one of the lowest in the entire round-up, showing that this card can handle 32 voices with ease.

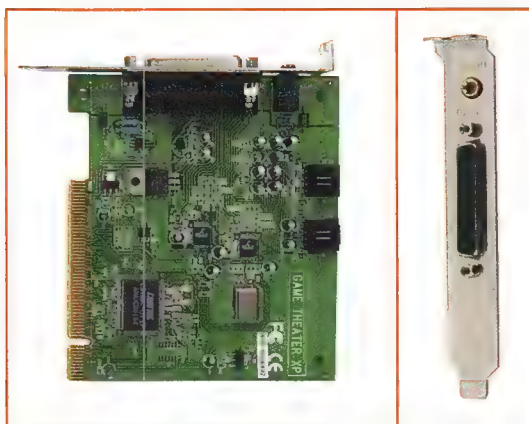
While this card lacks many of the additional features of the other Live! sound cards, its combination of a low price, excellent sound quality, high performance and full hardware EAX support make this sound card the one Atomic recommends to those on a budget.

Hercules Game Theater XP**Price:** \$329**Sound quality:** B**Package features:** 9

Like the Platinum pack, the Game Theater uses an external rack for all your input and output needs. In fact, the actual sound card only has two connectors: one proprietary DB25 connection for the massive cable that connects the sound card to the rack, and a single 3.5mm stereo input. This rack is not mountable within the case, unlike the Live! drive, but its attractive lines mean it won't look out of place perched on top of your tower.

Onboard the rack there are over 20 different inputs and outputs, including both digital and coaxial outputs for a 5.1 setup, enabling you to use a decoder if you have one, or to run 5.1 even if you don't. It includes a four-port USB hub, so it should be able to handle most of your USB devices.

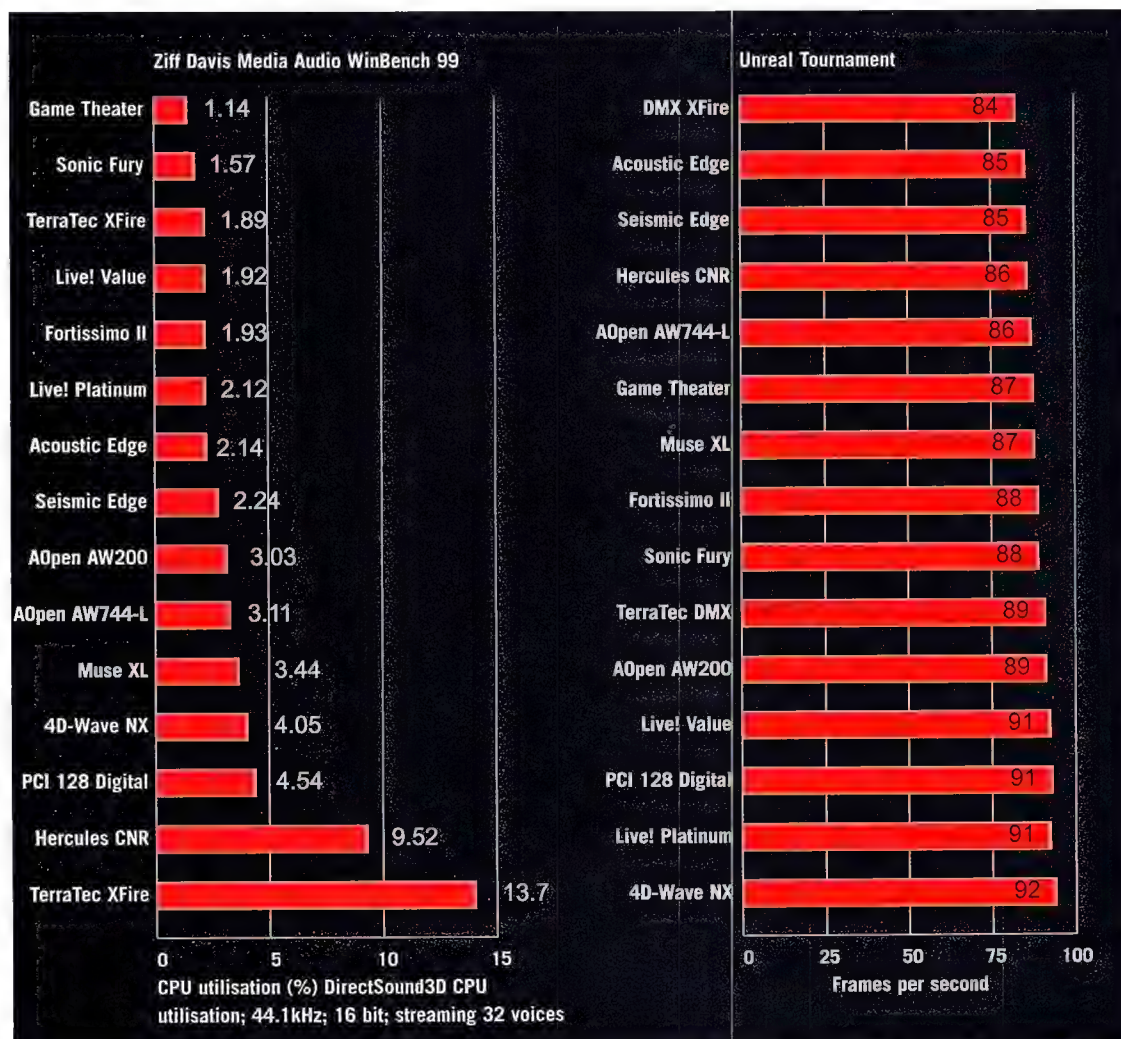
The Game Theater uses a Crystal CS4630 audio processor, and our CPU utilisation tests prove that this can easily handle 32 voices, scoring the lowest utilisation of only 1.14%. Unfortunately, its Unreal Tournament score of 87fps isn't quite as impressive.



 **Hercules**
Game Theater
XP

This is probably caused by the use of Sensaura 3D for positional audio, as it must convert the EAX signal to the Sensaura before being played.

Other than the slightly lower UT score and lack of true EAX support, this package has what it takes to be the ultimate gaming sound setup. Whether or not you choose this card over the Live! Platinum pack will come down to whichever has the most suitable speaker outputs for your speaker system.



Philips Seismic Edge and Acoustic Edge

Seismic Edge

Price: \$199

Sound Quality: 9

Package Features: 6

Acoustic Edge

Price: \$249

Sound Quality: 9

Package Features: 7



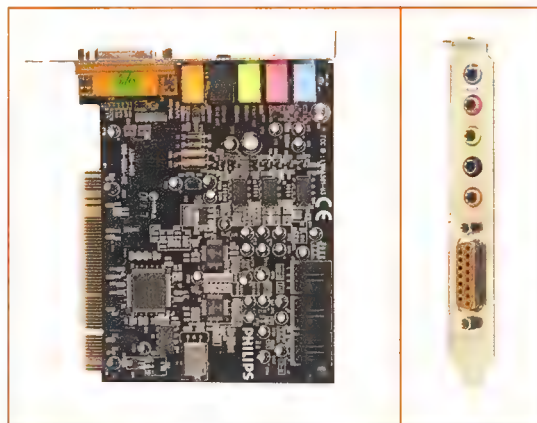
Philips is one of the largest electronics manufacturers in the world, with a huge variety of products ranging from things you stare at to things you remove facial hair with. It also happens to have quite a healthy reputation with the audiocentric audiences. With such a large company and reputation behind the Seismic Edge and Acoustic Edge sound cards, you'd think it would have the resources to create a sound card that isn't a pile of smelly brown stuff. And you'd be right, as these two newly released cards proved when being put through their paces in our sound card round-up.

Both cards are basically identical, with a few minor changes in output options. The Seismic Edge is the cheaper of the two, retailing for just under \$200. Lower prices usually equate to less functionality, and the Seismic Edge is no exception.

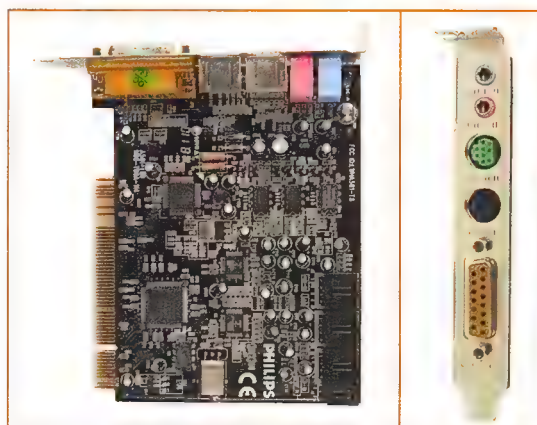
Where the \$249 Acoustic Edge has two digital coaxial ports running off a single proprietary 9-pin connection at the rear of the card, one each for input and output duties, the Seismic Edge uses a single 3.5mm minijack connection to output a digital signal, with no digital input. The Seismic Edge is also missing the onboard digital CD input that the Acoustic edge features. So unless you absolutely positively must have coaxial digital inputs and outputs, the Acoustic Edge is definitely the better buy of the two.

Both cards support analogue 5.1 speaker outputs, without the need for an external decoder, via the usual 3.5mm stereo minijack for the front, rear and centre/sub channels. If you check the US Philips Web site, it doesn't mention the capability of the Seismic Edge to output analog 5.1 without a decoder – no doubt in a bid to get people to buy the more expensive Acoustic Edge – but the Seismic can do it.

Both of these cards use a Philips Thunderbird chip, with the Acoustic



Philips Seismic Edge



Philips Acoustic Edge

'... unless you absolutely need the extra ports on the Acoustic, save yourself \$50 and go Seismic.'

being capable of 256 simultaneous voices, although it's not clear as to whether all of these are being done by the card's hardware or if some are software emulated. The Seismic is able to handle half that, with a maximum of 128 voices. Throughout all of our tests both of the cards provided an exceptionally clear sound, standing out from an otherwise uniform crowd.

Both ship with extremely user friendly documentation, but the installation still wasn't quite as care free as the rest. Both required a quick game of PCI slot musical chairs, as well as the reservation of the relevant IRQ in the BIOS, before the PC would boot stably with the card in place. They were the only cards in the roundup that needed such prodding to install correctly but it could be a quirk they have with our ASUS CUSL2 motherboard.

Philips is one of the few sound card manufacturers who has used QSound Labs' Q3D technology to provide 3D positional audio, which has usually been implemented in a software form in the past. This is compatible with both EAX 1.0 and 2.0, as well as A3D. Our subjective WinBench 99 3D positioning tests showed that this technique is, at the very least, equal to EAX, although it looks as if it does incur a significant performance hit.

In fact, the duo scored some of the lowest Unreal Tournament frame rates, with the both of them hitting 85fps. This is extremely surprising

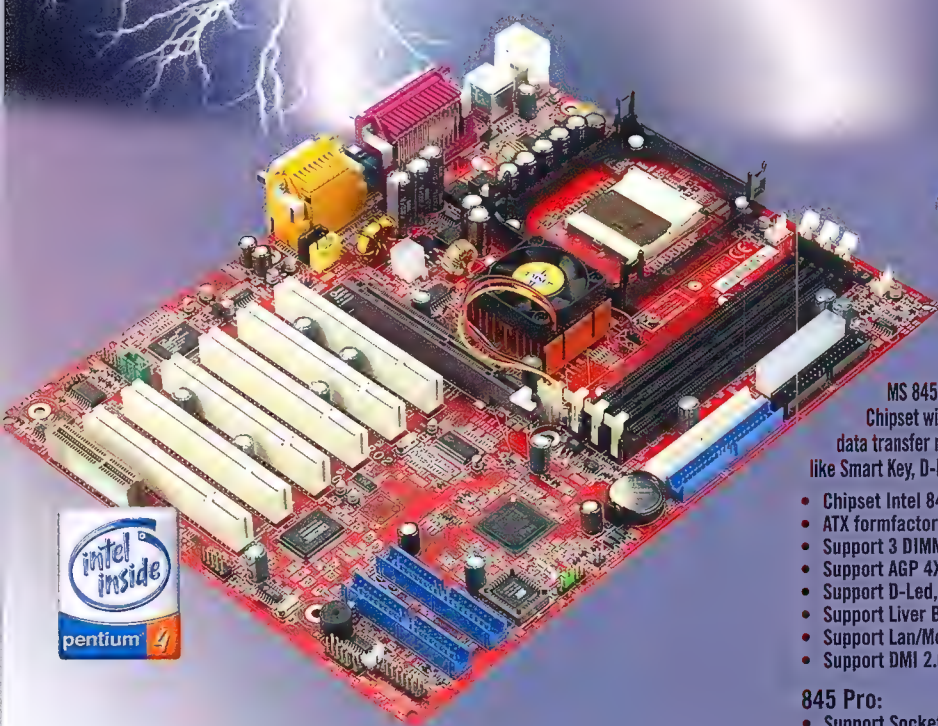
considering that Philips is promoting the card as one of the most powerful on the market. This is exactly why we benchmark, and don't just publish the figures in the PR brochures.

The capability to handle over 100 voices at a time no doubt helped the sound cards out in the WinBench 99 test; the Seismic Edge had a utilisation of 2.24 % and the Acoustic Edge had a utilisation score of 2.14%.

It's amazing that you can now buy a sound card that can output without a decoder to 5.1 speakers for less than two hundred big ones. Like we said before, the Seismic is definitely a better buy than the Acoustic, so unless you absolutely need the extra ports on the Acoustic, save yourself \$50 and go Seismic. Besides, everyone at Atomic agrees that it's a much cooler name than the Acoustic.

No matter which card you choose, you won't be disappointed with the exceptional sound quality, although this does come at a slight performance hit when compared to the rest. But if sound quality is your thing, this hit won't really matter.

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Link to the Future

845 steps to paradise

SDRAM has arrived for the P4, and after John Gillooly stopped dancing around singing 'Ding dong, the witch is dead,' he took a look at how it shapes up.

The Pentium 4 still hasn't gotten its big break.

Despite regular huge price cuts the cost of Pentium 4 systems has been prohibitive. There have been two major reasons for this: the complexity needed to make six-layer i850-based motherboards, and the ever-present party pooper Rambus and its proprietary RDRAM.

The days of being forced to live under the RDRAM cloud are allegedly over. With the release of the 845 chipset, Intel has finally provided a mainstream solution for the Pentium 4 using the now ridiculously cheap SDRAM as a foundation. The 845 chipset also has the potential to support cheaper DDR SDRAM as well; however, support for it will not eventuate until next year.

The potential problem is that SDRAM may not have sufficient bandwidth to cope with the Pentium 4, which was designed for the higher bandwidth RDRAM. This is where a DDR platform would be more sensible than SDRAM, and also somewhere that third-party chipset manufacturers stand to make major headway. At the moment, VIA has a Pentium 4 DDR chipset ready to go, but VIA has not made any direct licensing deal with Intel. Instead it is relying on licensing deals made in the past between graphics manufacturer S3 and Intel.

SiS also has a DDR chipset ready, the SiS645, as does ALi with the Aladdin-P4 M1671. Both are directly licensed from Intel and should start appearing over the next month or two.

The i845 chipset has been released alongside the new 478-pin form factor for the Pentium 4 processor. The 478-pin socket is much smaller than its 423-pin predecessor; however, there have not been any changes made to the CPU itself. For these changes we have to wait for the upcoming Northwood Pentium 4s, which will feature a die shrink to 0.13 micron.

The Pentium 4 should stay split into two socket designs for a short while; however, the Northwood CPUs should signify a shift towards the sole use of the 478-pin form factor. One major headache involved with this shift in sockets is that the 478-pin CPUs use totally different heatsink mounting points to the 423-pin CPUs. This causes only one major problem – the inconvenience of needing a new heatsink when upgrading – but it is interesting because Intel seems to have abandoned the need to bolt the heatsink mounting brackets straight through the motherboard and into the case. All the i845 motherboards that Atomic has seen have single-piece rectangular mounting brackets for the heatsinks, rather than the two-piece brackets used for mounting heatsinks on i850 motherboards.

Same CPU, different speed

The first 478-pin processor that we received from Intel runs at 2GHz, which is, unfortunately, 200MHz faster than the nearest available 1.8GHz 423-pin processor. Happily, the samples of the 2GHz processor are multiplier unlocked – a rarity from Intel. This has allowed us to underclock the processor in order to compare the i845 running SDRAM with the i850 running RDRAM at the same CPU speed.

It is not surprising to see that RDRAM smacks SDRAM around by a decent margin in all our tests. In the Internet Content Creation portion of SYSmark2001 this difference is only 4%; however, this jumps to 14% in the Office Productivity tests. This translates to an overall difference in SYSmark rating of 9%, which is a fairly significant performance gap between the types of RAM.

In Quake 3: Arena (Q3A) the difference between SDRAM and RDRAM blows out to a stunning 27%. Q3A has always been kind to Intel processors in benchmarks, and this gap shows that it is still one of the few programs that is highly sensitive to even small changes in the system configuration.

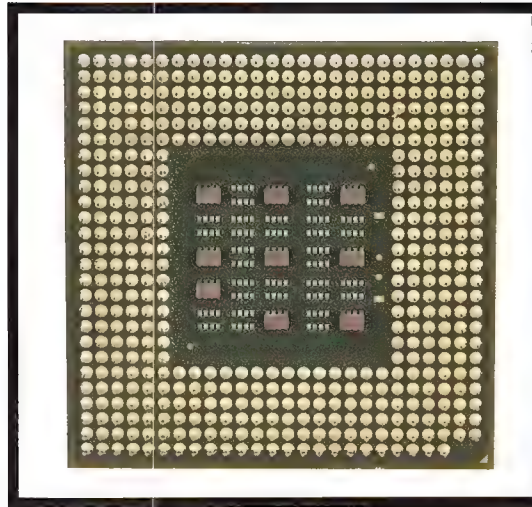
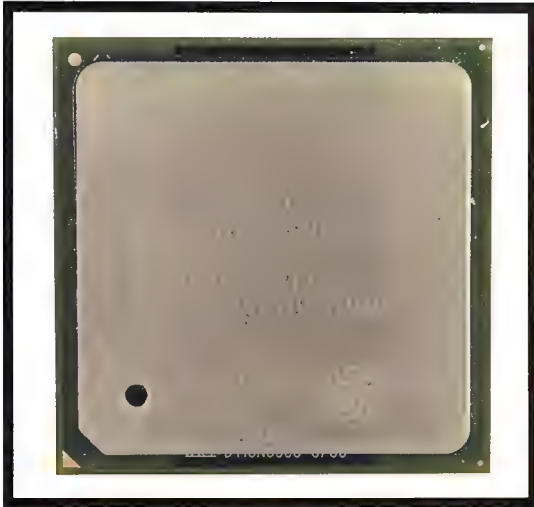
Sandra2001 demonstrates nicely the difference between theoretical and realistic benchmarks. The major difference between the two testbenches is the memory bandwidth tests, in which the RDRAM system shows a theoretical boost of 155% in the Int ALU tests and 170% in the Float FPU test. These impressive numbers in no way tally with the actual performance of the two chipsets, which is a similar picture to that painted by early DDR SDRAM chipsets for the Athlon.

The bus that couldn't slow down

When we wind the 478-pin processor back up to 2GHz and run the same tests, the SYSmark ratings are much closer. In the Internet Content Creation the i845 pushes ahead of the i850, largely because of the need for processing grunt in the included applications. The Business Productivity tests show the i850 winning, but only by a narrow margin.

The disparity between the two chipsets re-emerges in the Quake 3 tests. The increased processing speed leads to a performance boost in the order of 2%, demonstrating that Q3A performance is not being limited by the CPU, but rather by the different RAM types used in the two testbenches.

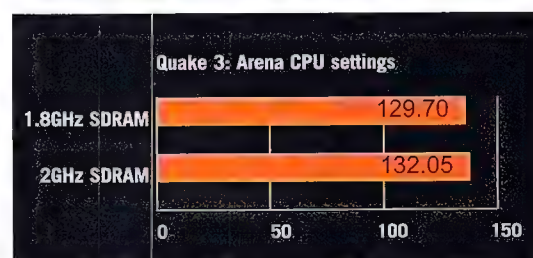
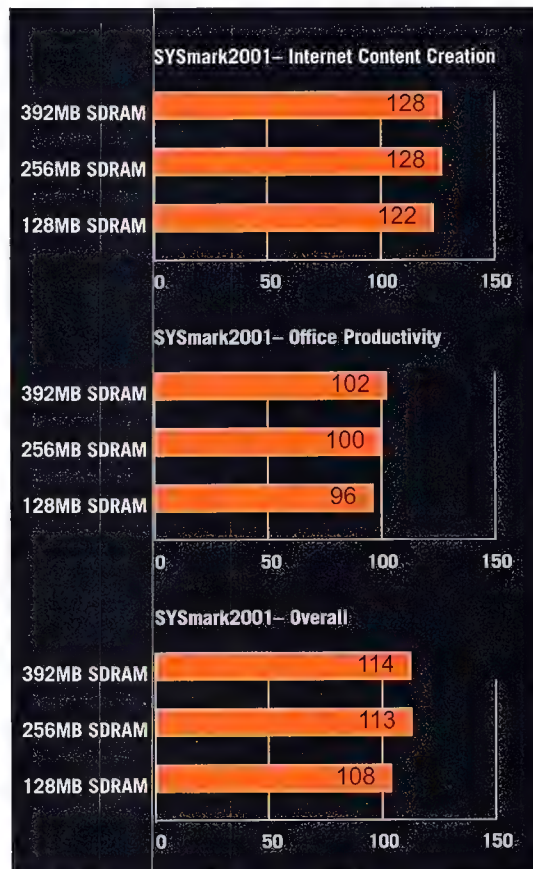
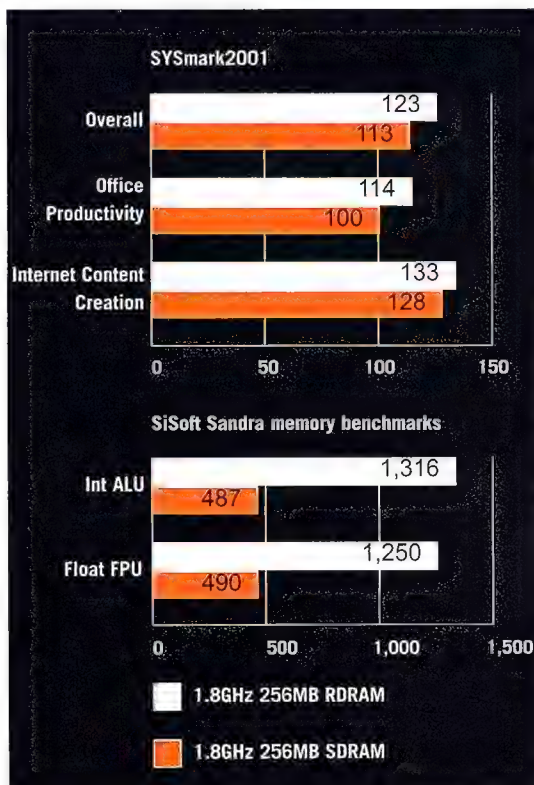
It is a very interesting point to see that applications are the major benefactors of the jump in CPU speed. This flies in the face of what a lot of companies keep saying; that office application performance has peaked and that the main reason for speed increases is for gaming.



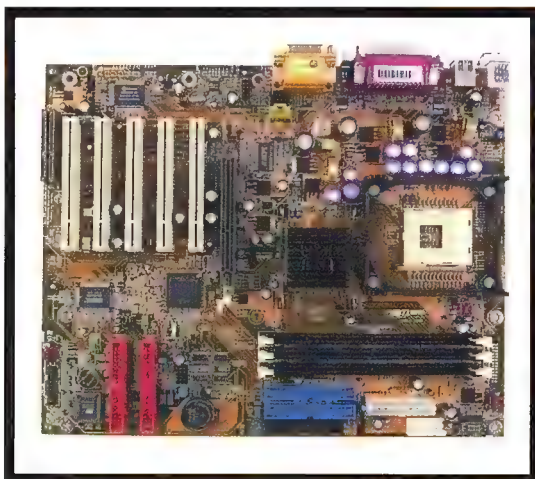
❗ The tiny 478-pin 2GHz Pentium 4 processor in all its glory. For scale, the processor is roughly the same size as a 20-cent coin.

'... 256MB is definitely the sweet spot for performance.'

As a final test, we compared the performance of the 2GHz CPU with different amounts of SDRAM in SYSmark2001 under Windows Me. The amount of SDRAM needed is not incredibly important given the price of the stuff at the moment, but it is relevant to see where the sweet spot is in terms of performance. All the tests show that performance in SYSmark2001 peaks with 256MB of SDRAM. This will differ under more memory-friendly OSes like Windows 2000, Windows XP and Linux, but for the moment 256MB is definitely the sweet spot for performance. ➤



 The DFI NB72-SR motherboard that was used to test the i845 chipset.



price-cutting strategy. After the latest round of hacking and slashing, the Pentium 4 is now much cheaper than the brand-new Tualatin Pentium III CPUs. The budget-range Celerons are still the cheapest offering from Intel; however, they still come a poor last when compared to the ever-improving and recently revamped Duron from AMD. This inequity in the budget market should improve with the eventual release of Tualatin-based Celeron processors.

The major factor holding Intel back at the moment is its deal with Rambus. This means that Intel needs to ensure that it sells a large amount of its chipsets with RDRAM support. The main problem with this deal is quite simply that RDRAM is still incredibly expensive when lined up against SDRAM and DDR RAM, and the performance difference just does not scale with price.

'After the latest round of hacking and slashing, the P4 is now much cheaper than the brand-new Tualatin Pentium III CPUs.'

The future is?

Intel has made a decent, but somewhat belated, move in releasing the i845 chipset. While the support for SDRAM is a good idea in terms of cost, it is probably more likely that the major explosion in the Pentium 4 will come later down the track when Intel actually releases a DDR-compatible version of the i845. The impending arrival of DDR-based chipsets from VIA, ALi and SiS should also help the Pentium 4 take a stronger hold of the market.

The other thing that will help the Pentium 4 finally move into the wider market is Intel's very aggressive

The i845, in its current SDRAM-only form, is not the chipset of choice for those who want peak performance from the Pentium 4. As much as it causes alarm bells to go off in my commonsense monitor, and despite the stabbing stomach pains that accompany the following statement, if you want to get the most from the Pentium 4, then the i850 with RDRAM is the way to go until third-party manufacturers unleash their DDR chipsets. The performance difference may not match the theoretical differences, but it is significant enough to make SDRAM a poor second in the speed stakes. 

The chip hits the fan

There has been quite a storm brewing over VIA's move into the Pentium 4 chipset market. The DFI 200-compatXSM chipset uses PC2100 DDR RAM rather than the slower SDRAM used by Intel in the i845 chipset.

Sending a brand-new memory controller, and known as the VIA Apollo P4200, Intel has taken more with the fact that VIA is not directly licensed to produce chipsets for the Pentium 4. VIA's counter argument is that it must have rights through old licensing agreements between Intel and SiS, VIA and S3/NEC, the latter now come full 3D now, the SiS Graphics as a joint venture - a fact that VIA is using to validate its use of the Pentium 4 bus.

In the meantime, Intel is still locked into its deal with Rambus. In order to benefit from this deal, a large proportion of all chipsets sold by Intel need to support RDRAM. The major problem Intel has is that Rambus has not managed to deliver a solution that is commercially viable. With the drop in SDRAM prices, DDR has nearly followed in the mainstream and is now priced very reasonably at half the price of a single equivalent stick of RDRAM. Because RDRAM must be paired, this means that the total cost of RDRAM can end up being about four times that of DDR.

Even though it is still a wildcard in the Pentium 4 race, it is almost certain that, given a dedicated memory controller, DDR should provide a major boost over SDRAM for the bandwidth-hungry Pentium 4. This is supposed to be a key reason why Intel has created the i845 for SDRAM only, even though the chipset does support DDR. This would be another major reason why Intel is so against VIA releasing a DDR chipset to compete with the i845.

The inter-company argument came to a head with VIA making a press statement asking Intel to stop behind-the-scenes efforts to stop the P4200. The release, calculated in this case for safety from VIA's director of marketing, Richard Brown, Intel should deal with both openly and communicate through official press releases rather than threatening customers and sowing seeds of doubt in the marketplace.

The big name manufacturers are still locked in release a P4200-based motherboard, even though many of them have already moved to go. Expect to see those boards appearing from mid- to low-tier manufacturers first (who have the most to gain and least to lose from the move), as VIA has offered legal protection to them in case of any official action against the chipset by Intel.



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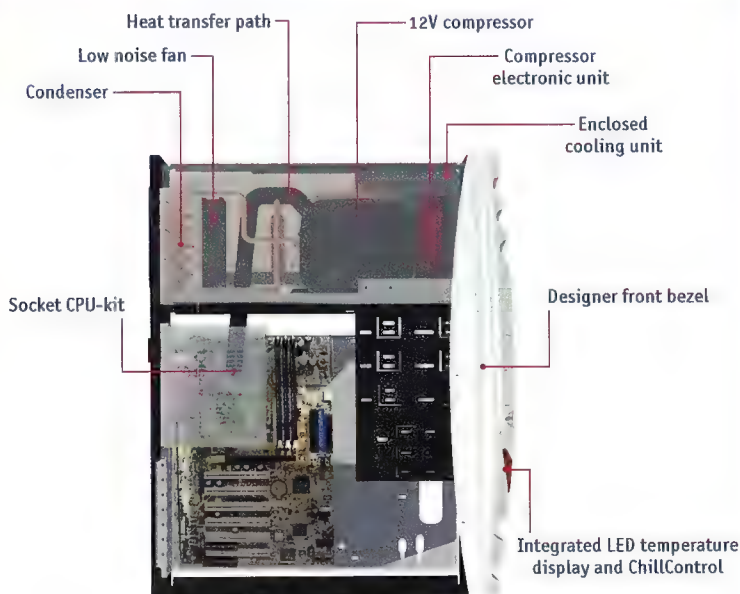
Designer
front bezel

Added support for
Socket type CPU's

Extra 5 1/4"
drive bay

Now integrated
temperature LED display
and ChillControl

Extra fan hole





reviews

Please Sir, may I have some more?

About ten years ago, you would have been hard-pressed to find a device that could duplicate CDs for less than \$70,000. In fact, the very first CD duplicator to hit the US market cost a staggering \$300,000, and recorded CDs at the paltry speed of 1x.

While today most of us could easily install a CD burner – by simply hook up a single IDE cable along with CD audio and power cables – the burners of the past were a complicated affair. Not only did they have a special drive for recording the media, they also required a special circuit board for error correction as well as a proprietary hard drive system to feed the data. The cost of the media was slightly more expensive at the time, at around \$200 for one blank CD. These days you can buy a decent hard drive for that price.

However, time waits for no CD burner, and we now have



‘... the CD burners of today are magical pieces of hardware.’

24x burners that can fill a 700MB CD-R or CD-RW for \$2 in a matter of minutes, with buffer underrun protection to boot. When you consider what we had to put up with ten years ago, the CD burners of today are magical pieces of hardware.

But even the hallowed CD-R format is beginning to get tired. With the coming of the multimedia revolution also came a demand for larger capacity storage devices, to store the huge audio and video files necessary for a rich multimedia experience. Even the once massive capacity of 700MB wasn't enough for some of the applications being created, with games being the prime example of a capacity-hungry application. Anyone remember Under a Killing Moon, and the four CDs you'd constantly need to swap?

While the more recent DVD revolution promised to provide us with the storage sizes our eyes and ears demand, the fragmentation of standards and feuding protocols has left the promise of cheap DVD recordable media floundering in the sun like a fish out of water.

But fear not, because a solution is going to hit our shores in March 2002, in the shape of a drive that can burn just over 2GB to any standard blank CD-R or CD-RW. The company you'll want to thank for the new Multilayer CD drive is TDK, but the actual technology was developed by a US company known as Calimetrics. Here's how it works . . .

Current CDs use a two-depth scoring technique to record data, with each score being either black or white. This is a simple binary way of encoding the data; one depth is on, the other is off. However, the Multilayer CD drive uses an eight-depth scoring technique, with various shades of grey instead of just the black/white combination used on traditional CDs. This allows it to pack 3 bits into the space that was previously occupied by 1 bit, thus tripling the capacity of the drive. This technique doesn't require major changes to the drive; it needs only a Multilayer chip to enable it. So you can expect these drives to cost about the same cost as a standard CD burner.

A side effect of squeezing 3 bits into the space of 1 bit is a tripling in drive speed, without increasing spindle speed. The first TDK drive is actually a 12x drive, but due to the tripling effect, it can record at 36x, easily making it the fastest and most affordable CD burner for the home user.

This tripling in capacity will also herald the arrival of new 6cm CD-R media, with a capacity of over 500MB each. These discs should make CD-R truly portable storage, putting it directly in competition with much higher priced formats such as Zip disks and flash memory. TDK is already developing a new device to take advantage of these 6cm discs, in the form of an MP3 player: it's due for release late 2002. No doubt someone will also release a portable CD burner based on this disc size.

If and when the developers of DVD-RW and similar DVD technologies agree to a single format, the benefits of Multilayer await to triple their capacities. But if the slow development of DVD recordable technology is anything to go by, don't hold your breath waiting for the first Multilayer DVD drives.

Given the extremely cheap price of current CD-Rs and CD-RWs, the ability to triple data capacity makes a ridiculously low-priced storage medium an even better buy. Let's all salute the fine men in lab coats at Calimetrics for coming up with such a powerful yet value-packed technology.

Bennett Ring



atomic benchmarks

Take a look inside the Atomic Labs testing procedures.

Here at Atomic it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something we take very seriously in the Atomic Labs.

SYSmark2001

SYSmark is a product of the collaboration between industry group BAPCO (www.bapco.com) and MadOnion (www.madonion.com). It is the first of the next-generation application benchmarks and is designed to more accurately replicate the day-to-day workload that a system is subjected to. The benchmark focuses on Internet content creation and office productivity tasks in order to generate a final rating.

SiSoftware Sandra 2001 Professional

Sandra, from SiSoftware (www.sisoftware.co.uk), is a comprehensive benchmark and diagnostics utility. It contains dozens of special module applets that retrieve detailed information about the specifications and settings of a system, by polling each component's built-in firmware or BIOS. Sandra also features a small suite of synthetic benchmarks for specific components such as CPU, memory, CD-ROM and hard disk. It also features a burn-in wizard for stress-testing overclocked systems.

3DMark2000 Pro

3DMark2000 Pro from MadOnion (www.madonion.com) is a powerful benchmark for testing Direct3D performance, and is the successor to the popular 3DMark99 MAX. Although it is a synthetic benchmark, it uses the advanced MAX-FX 3D engine from Max Payne, which is representative of the latest in Direct3D performance and technology.

3DMark2001 Pro

3DMark2001 Pro from MadOnion is the next progression of the popular benchmark. It also uses the MAX-FX engine and heavily emphasises

DirectX 8.0 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Video2000

Video2000 is another MadOnion product designed to test video card performance. It doesn't measure 3D performance, but instead focuses on visual quality and video decoding performance.

Quake 3: Arena AtomicMPC Demo

Quake 3: Arena (Q3A), from id Software, is the very popular first person shooter representing the latest in OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, and are not representative of the worst conditions that the game can offer to a graphics card. So we developed our own AtomicMPC Demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, or a particular facet of 3D like T&L or SSE. For these specific purposes we can draw on a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Evolve, MDK2, Adaptec ThreadMark, Aquamark or Serious Sam. Whenever we use one of these special benchmarks we will outline the nature of the tests, the testing procedures and any settings we use.

atomic testbench specs

There are two testbenches in the Labs: one for running AMD processors and one for Intel processors. Both run Windows Me, DirectX 8.0a or DirectX 8.0. LiveWare 3.0 for Windows Me, and Detonator 12.41 drivers.

- AMD Athlon Thunderbird 1GHz system - ASUS A7V133 motherboard
- Intel Pentium III 1GHz system - ASUS CUSL2 motherboard

(Both systems supplied by CASSA, www.cassa.com.au)

- Intel Pentium 4 system - ABIT TH7-RAID motherboard

(Supplied by ABIT, www.abit.com.tw)

Common components

- Transcend 128MB PC133 CL2 SDRAM (Supplied by CASSA)
- Transcend 128MB PC2100 DDR RAM (Supplied by CASSA)
- Samsung 256MB PC800 RDRAM (Supplied by CASSA)
- 20GB Ultra DMA/100 7,200rpm hard disk drive
- Hercules Prophet II GTS 32MB (Supplied by GaNemot, www.hercules.com)
- Sound Blaster Live! Player (Supplied by Creative Labs Australia, www.creativelabs.com)
- ASUS 12x DVD-ROM (Supplied by CASSA)
- Floppy disk drive

Benchmark settings

3DMark2000 Pro

- 1,024 x 768, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,024 x 768, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer

Quake 3: Arena AtomicMPC Demo

All tests use Quake 3 1.27g

- CPU: 320 x 200, maximum geometry detail, minimum graphics settings, high sound quality
- Graphics cards: 640 x 480, normal quality graphics settings, high sound quality
- 1,024 x 768, maximum graphics settings, high sound quality
- 1,600 x 1,200, maximum graphics settings, high sound quality

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Toshiba Satellite 3000

John Gillooly discovers that notebooks are no longer just mobile DivX ;-) players.



All these bells and whistles add up to an intimidating piece of hardware; however, the charms of the notebook design go beyond the hardware components. Little touches like the complex heat pipe system used for CPU cooling, and the easily accessible volume and CD player controls on the screen hinge, demonstrate attention to detail in the design and construction.

Mobile gaming

To many, 16MB of video RAM may seem insignificant, but this allows the notebook to pump out the polygons at a respectable rate. The overall performance is similar to a mid-range desktop system running a GeForce2 MX. It scored 4,953 3DMarks at 1,024 x 768-pixel resolution using the standard 3DMark2000 Pro test. In Quake 3: Arena the notebook delivered a playable 34 frames per second at 1,024 x 768. Not earth-shattering performance, but nothing to complain about either.

The screen quality is good, but it does suffer the common problem of a highly restricted viewing angle and slightly blurry motion, which can make gaming problematic. If you can find a comfortable position, then this is only a minor inconvenience. The other niggle is the necessary use of the smaller laptop keyboard and Toshiba's traditional miniature joystick-style mouse replacement, which is used by Toshiba instead of the now ubiquitous touchpads.

'... 16MB of video RAM seems insignificant, but this allows the notebook to pump out the polygons at a respectable rate.'

When compared to the cutting-edge desktop machines, notebook computers sit well behind on the power curve. The traditional differing roles mean that notebooks are generally poorly suited to things like gaming. NVIDIA gave this a shake-up late last year when it announced the birth of the GeForce2 Go, a cut-down version of the GeForce2 MX designed for the low-power notebook market.

Toshiba has combined the GeForce2 Go with a host of other options to create the Satellite 3000, which is affectionately nicknamed The Beast. And a beast it is. Running on an 850MHz Pentium III, the graphics system uses 16MB of dedicated RAM, rather than the usual shared RAM used by most integrated graphics hardware. Unfortunately, the notebook comes standard with only 64MB of system RAM, with 128MB and above available as upgrade modules. This is somewhat disappointing considering the Satellite 3000 has been touted a high-performance machine.

Bristling around the outside of the case are two PCMCIA slots, three USB slots, one iLINK slot, one PS/2 slot, parallel port, D-Sub monitor output, an RJ-11 for the internal modem and one RJ-45 for the internal Ethernet adaptor, IrDA 1.1 port, headphone, microphone and speaker jacks, and a Smart Media slot, which is useful for those who use MP3 players. On the entertainment side, the satellite includes inbuilt speakers, a DVD drive and a 14.1in active matrix TFT screen.

This is mitigated by the inclusion of the various inputs and outputs. External keyboards and mice can easily be attached using either PS/2 or USB connectors, and the TwinView function of the GeForce2 Go means that adding a separate monitor is as simple as plugging it in and switching the display over using the NVIDIA driver control panel. It also allows a degree of flexibility above and beyond the simple toggle between screens that is often used for notebooks.

The Satellite 3000 is not suitable as a primary gaming machine for serious gamers, but it does provide a good level of performance for those who game occasionally and need the convenience of a notebook. While it has all the necessary parts for intensive gaming sessions like LANs, you still need a separate keyboard, mouse and, ideally, a monitor as well. This means that much of the convenience afforded by the notebook is eradicated.

As screens develop, mobile gaming will become much easier and much more comfortable. But for now, serious gamers should still stick to the humble desktop for the best fragging. ☐

SPECIFICATIONS

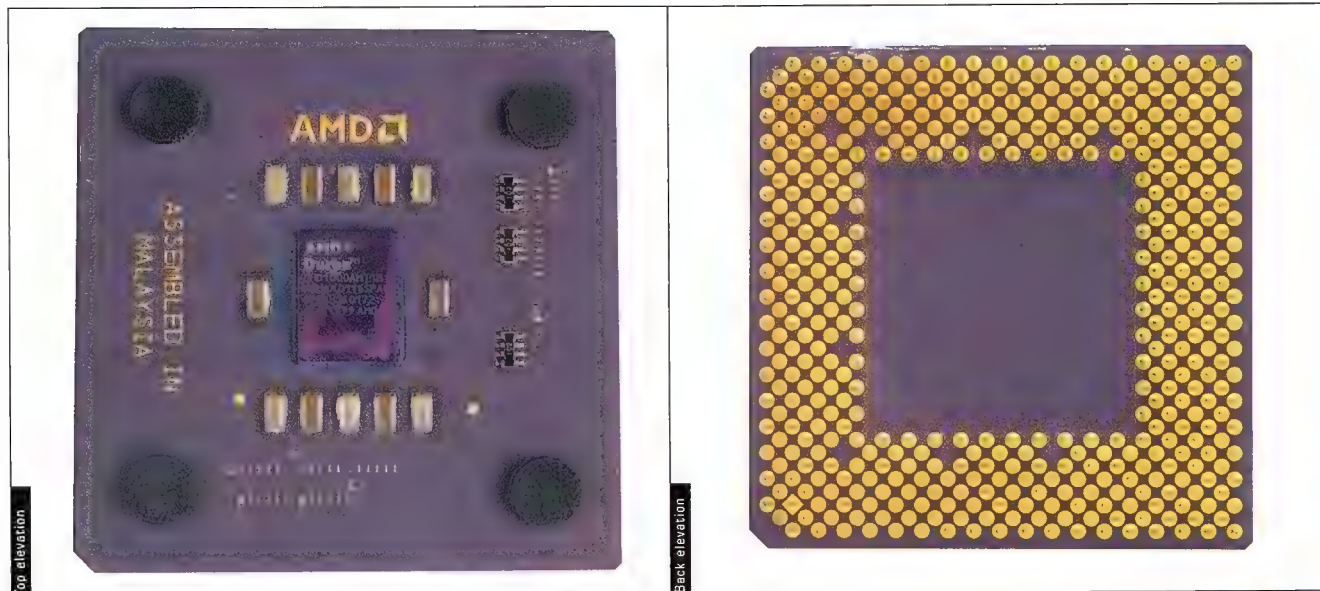
Pentium III 850MHz/100MHz FSB with Intel SpeedStep technology, 16MB NVIDIA GeForce2 Go, 14.1in TFT display, 2.6kg

Web site: www.isd.toshiba.com.au Price: \$4,620



AMD Duron 1GHz

The Duron rocks. Bennett Ring discovered that it rocks even harder at one gig.



It seems like only yesterday that the 1GHz barrier was shattered by AMD in one of its greatest ever coups over Intel. Here to remind us that a year is a lifetime in the computing world comes a budget processor rated at this once-amazing speed – the new AMD Duron 1GHz. This isn't just an ordinary Duron, though; just as the Athlon has moved to a spiffy new core architecture, so too has the Duron.

The original Spitfire Duron was a Thunderbird Athlon minus some of the level-2 (L2) cache, so is it any surprise that the Morgan Duron is an L2 cache-deprived version of the Palomino Athlon 4? Instead of the 256KB L2 cache that the regular Palomino Athlon 4 features, this amount has been cut back to a slightly less costly 64KB.

This also means that the new Morgan Duron features the enhancements that have been added to the Palomino Athlon. Included is an enhanced data prefetch mechanism, which predicts what data is needed before it is requested and then loads it from main memory into the Duron's cache. There is also an increase in level-1 (L1) translation lookaside buffer (TLB) entries, which should slightly enhance the processor's performance. Full SSE compatibility has finally been included, which will help with any applications that make use of SSE instructions. An in-chip thermal diode has also been built into the CPU, allowing for much more accurate temperature measurements than the in-socket diodes of the previous Duron. These temperatures are likely to be lower than the original Durons, as the new Morgan Duron draws up to 20% less power than its predecessor.

Unlike Intel's latest 478-pin Pentium 4, the new Duron does not require a total motherboard upgrade from the last generation of Durons. So if you've got a Socket A motherboard, the chances are high that a quick BIOS flash will make your board work with the new Duron. However, we were unable to get the processor to work reliably with our ASUS A7V133 motherboard, even after flashing to the latest 1006 version

Athlon 4-compatible BIOS. But we did manage to overclock the factory unlocked Duron to 1.2GHz in the A7V133, with a 9x multiplier and a 133MHz frontside bus, which seems to be the ceiling for these chips. We were expecting a higher overclock, but 20% still is not to be sneezed at.

When it came time to benchmark we had to use an ASUS A7V1-VM motherboard due to the stability problems our A7V133

'An in-chip thermal diode has also been built into the CPU ...'

had, limiting us to running on a 100MHz FSB. So our results aren't quite as good as what can be achieved with a 133MHz FSB motherboard. We ran both the normal Quake 3: Arena AtomicMPC Demo, as well as BAPCo's SYSmark2001.

In the Q3A test, the Duron averaged 87 frames per second, which is simply phenomenal for such a cheap processor. Unfortunately, this result is not directly comparable with earlier Atomic CPU reviews, which were done with a sound card in place. Its score of 86 in SYSmark2001 is also quite astounding considering the price of this chip.

As the results show, the new architecture lifts the performance above the expected increase from a normal clock speed increase. We've said previously that the Duron is a great budget CPU, and the new architecture gives it even more bang for your buck. The ball is now in your court, Intel. □

SPECIFICATIONS

128KB L1 cache, 64KB L2 cache, 100MHz FSB, new Morgan core, expanded L1 TLB entries, in-chip thermal diode, SSE compatible, enhanced data prefetch mechanism

Web site: www.amd.com Price: \$195

Intel Pentium 4 2GHz

Moore's Law helps us to 2GHz, and John Gillooly is there to point and stare.



The battle to be the first company to break the 1GHz mark was hard fought between Intel and AMD. The eventual winner of that battle was AMD, who managed to beat Intel to the 1GHz punch by a week or so. That was roughly 18 months ago (thank you, Gordon Moore). The 2GHz mark is now upon us, and it has been accompanied by very little fanfare. In fact the more exciting prospect is that the 2GHz Pentium 4 comes in the Socket 478 package, ready to deal with the new generation of SDRAM-based i845 motherboards.

The reason for this is that people are starting to comprehend that megahertz is not the be-all and end-all of performance. With lower clocked Athlons able to keep pace with the Pentium

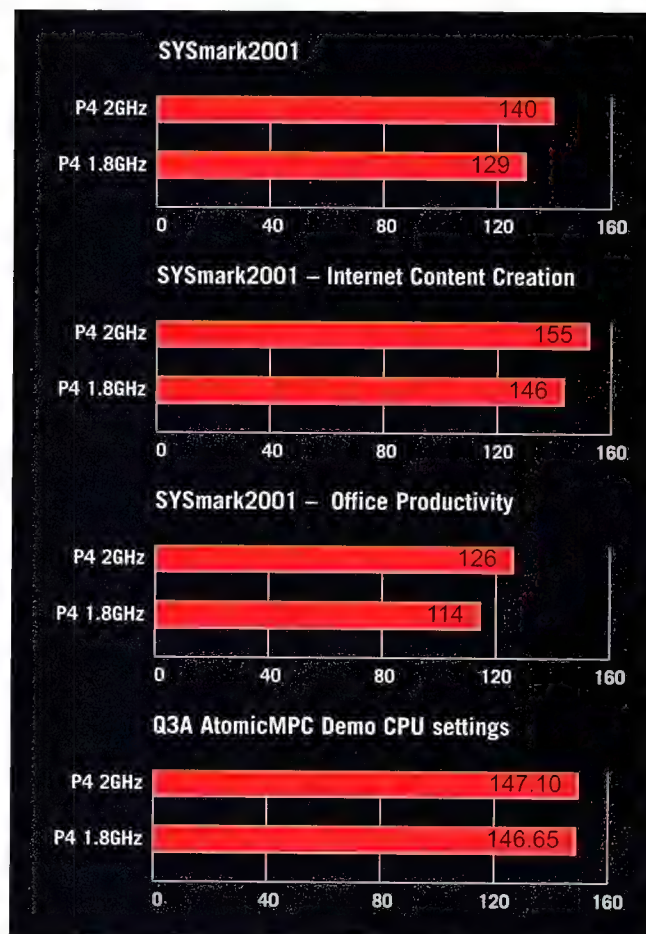
'The Pentium 4 is starting to mature nicely.'

4 in current applications, the 2GHz mark is nothing special. It is doubtful that this will last, but for now the decision between a 1.4GHz Athlon and a 2GHz Pentium 4 is still a difficult one.

The 2GHz Pentium 4 is the first processor that we have seen using the new 478-pin form factor. This makes for difficult benchmarking, as the only available 478-pin motherboards use SDRAM. This makes comparison between different speeds difficult, because the influence of RDRAM is difficult to ignore.

Atomic tested the processor using the DFI NB72-SR motherboard. For comparison we underclocked the processor to 1.8GHz (thanks to the joy of unlocked engineering sample processors), which is the speed of the nearest 423-pin Pentium 4 processor at the time of writing. All tests were run using 128MB of PC133 SDRAM.

In Quake 3 we are starting to see an upper limit emerge in terms of processor power. There is an almost unnoticeable



difference in performance between the two speeds. This difference becomes greater in the SYSmark2001 tests. In the Internet Content Creation tests the difference between the two speeds is a modest 6%. This increases to 10% in the Office Productivity tests. This difference in performance is to be expected from the jump that occurs between the two processor speeds.

These results are completely predictable, and we really do have to wait until the die shrink and potential cache boost that will accompany the Northwood Pentium 4 core before any major leaps in performance come around.

The Pentium 4 is starting to mature nicely. However, with the much more attractive SDRAM option now available and the magical 2GHz mark attained, it still won't excite the overclocking enthusiast. That said, it is the ideal processor for those who plan to build a long-term system. □

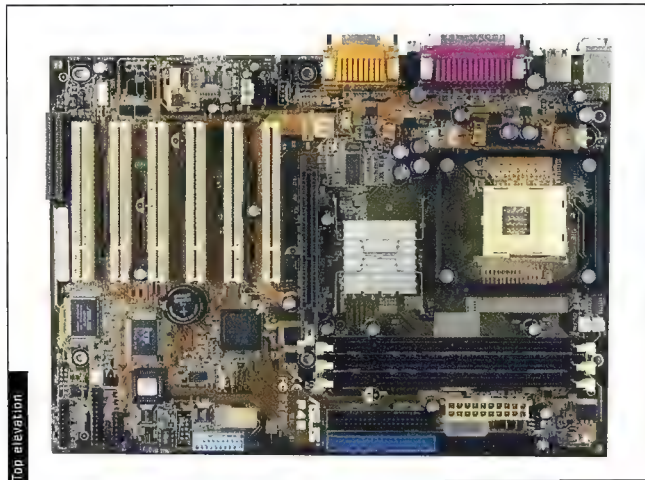
SPECIFICATIONS

Intel NetBurst micro-architecture, 478-pin form factor, SSE2 instruction set, integrated heat spreader, 8KB level-1 data cache, 12K micro-ops in level-1 cache, 256KB on-die level-2 cache

Web site: www.intel.com Price: N/A

ASUS P4B

The i845 has arrived, and John Gillooly checks out one of the first boards.



Sitting well on the first wave of i845 motherboards is the new offering from ASUS, the P4B. Its i850 motherboard, the P4T, had moderate success due to some innovative features that made it stand out from the background noise of so many other somewhat formulaic i850 boards. This is a legacy that is borne out by the P4B, which is bristling with a swag of connectors and added extras, including some that ASUS is debuting with this motherboard.

Rather than ASUS' usual approach of using an AGP Pro slot, the P4B only has a standard AGP slot. The annoying thing about this slot is that when a graphics card is mounted, it is impossible to add or remove RAM sticks because the card blocks one end of the DIMM retention clips. This is a minor inconvenience, but it's just plain fiddly if you like to swap RAM around.

The board was tested using a 2GHz 478-pin Pentium 4 processor coupled with 128MB of PC133 SDRAM. The performance levels were slightly higher than those of the DFI NB72-SR used in our i845 chipset examination on page 44. This is largely due to the second appearance of the slight BIOS-based overclock that seems to be a feature of the newer ASUS motherboards. Just like the A7V266, the frontside bus of the P4B runs at one or two megahertz higher than reported in the BIOS, which gets multiplied to an overall gain of about 20MHz on the 2GHz processor.

A problem with the board is the slightly flaky EZ Plug connector. At random intervals on bootup, the board will report an error and ask you to check the power settings in the BIOS. This happened with different power supplies. Through a process of elimination we deduced that it's due to the inclusion of two ATX 12V inputs on the board. If you skip past the error, the board still runs fine, so it is only a minor niggle that should hopefully be fixable with a future BIOS flash.

'Just like the A7V266, the frontside bus of the P4B runs at one or two megahertz higher than reported in the BIOS . . .'

The major feature of the P4T is its inclusion of a large, metal backplate, which allows the motherboard to be mounted in non-Pentium 4-compatible cases. The P4B does not come with this backplate, but it does include features to minimise the hassle involved with needing an ATX 12V power supply. The major part of this is the ASUS EZ Plug Auxiliary +12V connector, known to the wider community as a Molex connector. This means that those who have a standard ATX power supply unit (PSU) should not need to replace it to run this board.

There is one major problem with the placement of this plug. The Molex connectors on our reference Topower 300W PSUs have small, plastic notches on the underside that prevent them from connecting to the EZ Plug socket properly. This is easily fixed by carefully cutting the notches off the connector.

While the different use for the Molex connector is perhaps the most innovative feature on the board, it also has a huge number of other connectors. On the model with integrated sound this includes a blanking plate with two SPDIF connectors (one optical and one not). On all the boards there are connectors for smart card readers, Memory Stick (MS) readers, Secure Digital (SD) card readers, as well as an ASUS iPanel connector and a speech controller for vocal post warnings (a similar technology to Dr Voice, which is used on some other boards).

Interestingly, ASUS has included the 5.1 outputs for the onboard sound. This move could be perceived as a direct reaction by chipset manufacturers to the grand claims made by NVIDIA over its still unseen nForce chipset for the Athlon. One of the major selling points (and also the rumoured reasons for the delay of the nForce) is the inclusion of Dolby Digital 5.1 output as part of the MCP audio features. The outputs that have been included on the blanking plate with the P4B are digital surround only, and seem to be largely a showpiece. Integrated audio, as it stands today, is purely a money-saving feature and not a performance item (that's what we have sound cards for).

The P4B shows the attention to detail that we've come to expect from ASUS motherboards. The board is stable and solid, and has an amazing potential for added extras, especially if you're big on portable storage and are prepared to spend a bit extra for SD and MS readers. That said, the glitchy power connector means that it stumbles slightly at the POST.

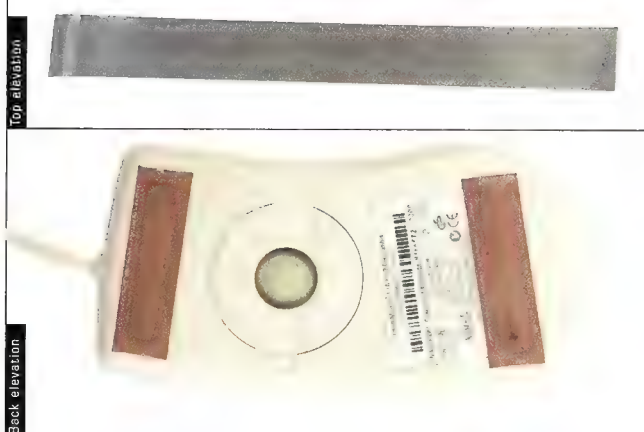
SPECIFICATIONS

Intel 845 chipset, supports 478-pin Pentium 4 processors, SD and MS reader connectors, EZ Plug Auxiliary +12V connector, three DIMM slots, six PCI slots, CNR slot, AGP slot
 Web site: www.cassa.com.au Price: \$359





Everglide MouseSkatez



There is a heartfelt pain that comes with having to replace an otherwise perfectly good mouse, because the once slick glide pads have become mousepad (or desk) gouging tools. No matter how good a mousing surface you use, over time those precious little pads get worn down, especially under the heavy burden of constant gaming.

The saviour has arrived in the form of two little pieces of teflon tape called MouseSkatez. These ingenious little strips are designed to sit on top of the glide pads to stop them from wearing out. They are definitely overkill, but that hardly matters; what does matter is that they actually work.

MouseSkatez come supplied in a paper envelope with a small alcohol swab for cleaning the pads. To install them, use said swab to, well, swab the glide pads and then measure enough tape to cover the pads. Cut them to the right size and then stick the skates on. It really is that simple. From our tests, we have found that a single strip is enough to reshoe an average-sized mouse, but that depends on the size (and number) of the pads themselves.

The end effect is highly impressive; you will find your mouse slipping and sliding like it was brand new, and those carefully honed but long since gone gaming skills coming back. Even your mousepad will thank you.

At first the price seems a little steep for two pieces of tape and an alcohol swab. However, for those who have suffered the personal indignity of having to fork out a wad of cash in order to replace an expensive mouse purely because the glide pads wore away, the price of MouseSkatez will not seem too great.

They may not give you a huge boost in slipperiness on a new mouse, but for mouses that are entering their twilight years, this is the miracle cure that we have been waiting for. □

SPECIFICATIONS

Package consists of two strips of 3m teflon tape, medical-grade alcohol swab. Mouse with screwed up glide pads not supplied with kit.

Web site: www.auspcmarket.com.au Price: \$20.90



SurgeMaster II



Your computer is probably your most cherished asset, so you want the best protection for it. While most of us negate operating an uninterruptible power supply (UPS) due to Australia's low blackout rate, it still makes good sense to have some form of surge protection. There are two common causes of voltage surges. Lightning is one, as even an indirect hit can cause a major upset in voltage that will seriously damage, if not destroy, your computer's power supply. Heavy-duty electric motors connected to your wall outlet may also cause surges in voltage, as powering the motor produces a backward electromagnetic flux (EMF), which results in lowered grid voltage.

The SurgeMaster II uses a thermal fuse to prevent large surges, providing protection for eight earthed sockets. This is such an impressive unit that it not only provides protection for

your standard sockets, it also has plugs for two coaxial cables and two phone sockets!

The board quality is respectable, although the tough plastic casing has a hollow feel to it. The socket layout is designed with an ample 5cm between each corresponding connector, giving more than enough space for your collection of fat AC adaptors. In between the primary sockets lie two coaxial sockets (female) and a line-in for your phone. Belkin obviously designed this unit with the intent of protecting all your connectors, from your VIVO video card to your phone and modem. The line-in for the phone is split into two line-outs, giving you a free socket for your fax or modem. All the sockets fit flawlessly and operation was glitch free. However, the board was unable to filter out the inconsistent voltage produced by my washing machine, which causes popping sounds in my speakers while in operation.

The well-designed SurgeMaster II provides your PC with all the protection it needs. If UPS is not a must, then this package makes a great deal of sense to the first-time buyer. But at \$179, perhaps the unit could use some price surge reduction. □

SPECIFICATIONS

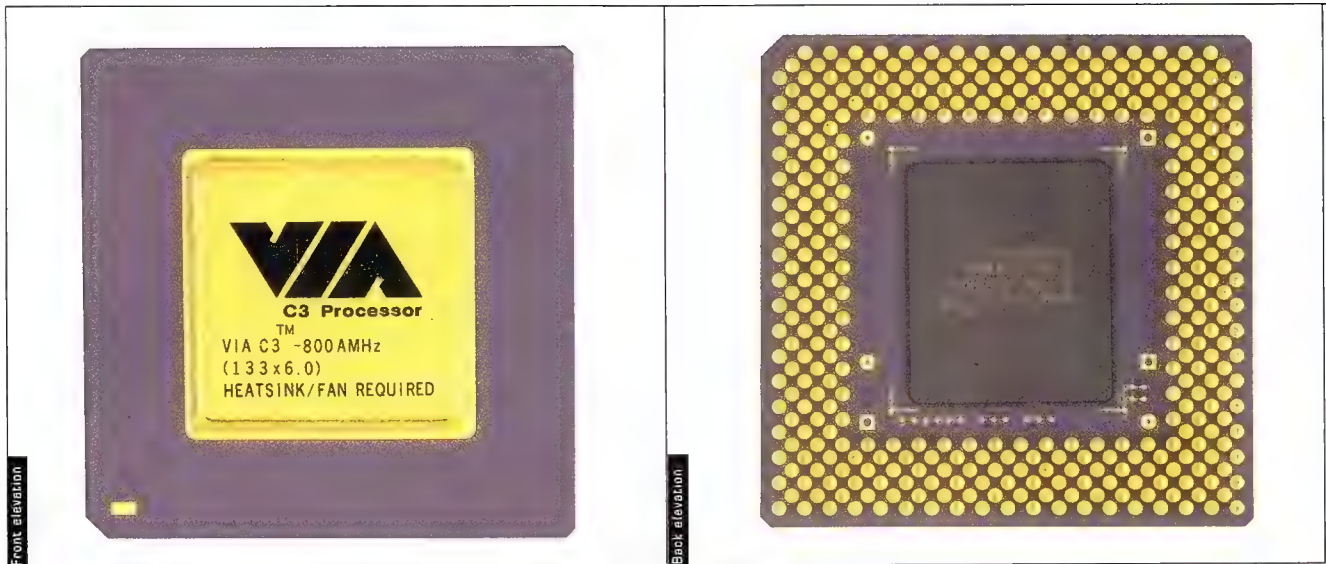
39,000-amp spike protection, eight standard sockets, two coaxial and two line-out sockets, 10-amp circuit-breaker, \$80,000 equipment warranty, lifetime warranty

Web site: www.belkin.com Price: \$179.95



VIA C3 800A

John Gillooly gets cheap and nasty with VIA's new budget processor.



It has been a big month in the CPU world. Intel has managed to crack the 2GHz mark, AMD has introduced the Morgan core with its new Duron while sitting back and watching Intel's 2GHz Pentium 4 stay neck-and-neck with the 1.4GHz Athlon, and VIA has released a new C3 processor that runs at 800MHz.

Let's make this clear from the outset. The C3 is not a high-end processor, even in the budget market. This is the line that VIA has delivered for some time now, and one that is borne out by the performance of the CPU. What the C3 is good for is cheap, cool and quiet computing.

The Samuel 2 core that is now used in the C3 processors has a major advantage over the original Samuel core that was used back when the processors were still marketed under the Cyrix name. This original core had some major deficiencies, notably poor FPU performance and no level-2 (L2) cache. With the Samuel 2 core VIA has included 64KB of L2 victim cache running at processor speed as well as bumping up the frontside bus speed to 133MHz. The final touch is a die shrink to 0.13 microns, which helps the C3 to run cool and quietly.

Beat the heat

When working with CPUs one of the biggest worries is heat management. More often than not a dead CPU fan is a one-way track to a dead CPU. There were some slight moments of panic when I opened the C3 package and associated heatsink, only to find no CPU fan (and no possible mounting points for one on the heatsink). Convinced that this was obviously intentional, the CPU was slotted into an ASUS CU4VX Socket 370 motherboard and the system was powered up. It was then left to run overnight under load. In the morning there was no smell, smoke or flames coming from the testbench; in fact, the heatsink was warm but by no means scalding to the touch.

This lack of need for hard-core cooling solutions opens up a whole range of possible uses for the C3. One of the main benefits of having no fan is that this significantly reduces the overall system noise. This in turn makes sense for those

circumstances where silence is golden, such as MP3 players or inconveniently located servers.

At about this point you may be wondering where the benchmark graphs for the CPU are. The simple answer is that there aren't any, because Windows has issues with this CPU. SYSmark2001 has one major Achilles heel, in that the included Windows Media Encoder software needs a 500MHz CPU to run. This is no great worry, as the C3 runs at 800MHz; however, Windows Me reports the CPU speed incorrectly in most cases. This causes some severe freak-outs with Windows Media Encoder, which caused SYSmark2001 to fail. Similarly, when installing Quake 3: Arena, the installation program came back saying that it needed a 233MHz processor in order to run, and then reported the C3 as being a 1MHz CPU. The latest version of SiSoft Sandra reports that the processor has an amazing 16MB of L2 cache, while the latest version of WCPUID accurately reports the cache as being 64KB.

This flaky dealing with Windows is somewhat of a concern, but it's to be expected from a notoriously Intel-focused operating system running a lesser known CPU. The problem is that this seems to impact on the performance of a few programs, which could cause a whole raft of annoying compatibility issues (in the short term at least).

The ability to run quietly, and the decent low-end grunt of the CPU means that it is perfect for several niches where competing processors run too hot or are just way too expensive. The lounge room MP3 player or the home-built Internet fridge are only some of the areas in which the C3 800A will shine. Just don't try to use it in your precious gaming box.

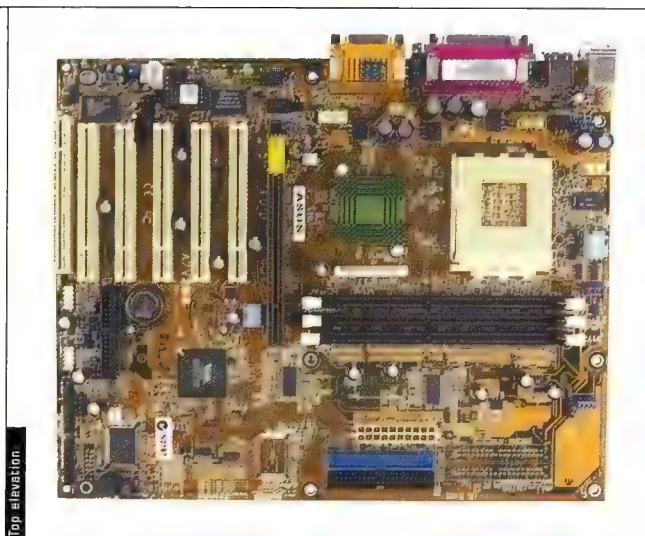
SPECIFICATIONS

800MHz Samuel 2 core CPU, 64KB L1 cache, 64KB L2 victim cache, MMX and 3DNow! instruction sets, 133MHz FSB, 0.13-micron process, low operating temperature

Web site: www.viatech.com Price: N/A

ASUS A7V266

John Gillooly wonders whether it's third time lucky for ASUS.



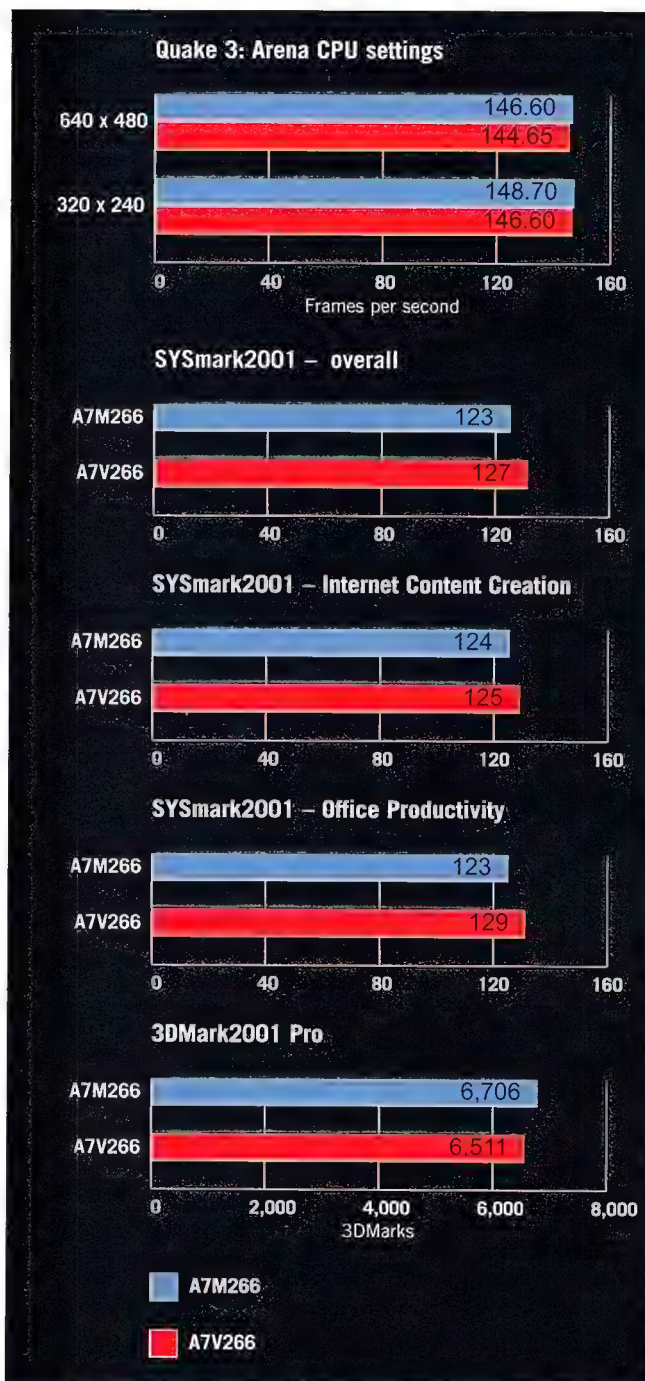
Since the release of the Thunderbird core for the Athlon, ASUS has released a plethora of boards. The A7V266 marks the third DDR board it has released for the Athlon, and its first foray into the world of the VIA KT266 chipset. Its first DDR board was the A7M266, which uses a hybrid chipset and employs AMD's 761 Northbridge and VIA's VT82C686B Southbridge. It's still one of the best performing DDR boards for the Athlon.

The KT266 chipset has been doing the rounds for a fair while now, and was marred by both buggy motherboards and less-than-stellar memory performance. ASUS has held off producing a KT266 motherboard for some time, even though the performance of its mainstream DDR board, the A7A266 was nothing to get excited about. Despite early rumours that this board was going to contain the new revision of the KT266 chipset, it uses the same bog-standard version, just tweaked.

The tweaking shows up in our tests. We benchmarked the board using a 1.2GHz 133MHz FSB Athlon with PC2100 DDR SDRAM. This was compared to the same setup running on the A7M266. Even though the AMD 761 Northbridge is regarded as having the fastest DDR controller around, the A7V266 stays close and even beats the A7M266 in the tests.

Thankfully, ASUS has included dipswitches for overclocking, as well as the usual assortment of voltage control jumpers. In fact, the board actually runs the frontside bus slightly faster than usual, even though it is set at 133MHz in the BIOS or via jumpers it will actually run at just over 134MHz, this is something that is consistent between different boards. We're unsure whether this is a permanent feature or a trick to get a few extra frames in reviews. The final release of the board should see one change: the inclusion of a fan for Northbridge cooling to replace the heatsink used in these early samples.

It is refreshing to see such a mature DDR board released so late in the picture. The performance of the new revision of the KT266 remains to be seen, but ASUS has managed to squeeze some serious performance out of the current one. As the price of DDR modules gets close to SDRAM, it is becoming more and more viable, and ASUS has delivered a nice platform for it. ☐



SPECIFICATIONS

VIA KT266 chipset, three DDR slots, five PCI slots, AGP Pro slot, Palomino ready, dipswitches for overclocking, cooling fan on Northbridge

Web site: www.cassa.com.au Price: \$359



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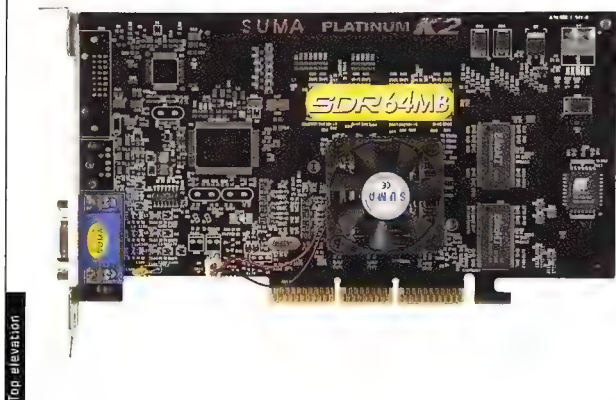
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Suma Platinum K2

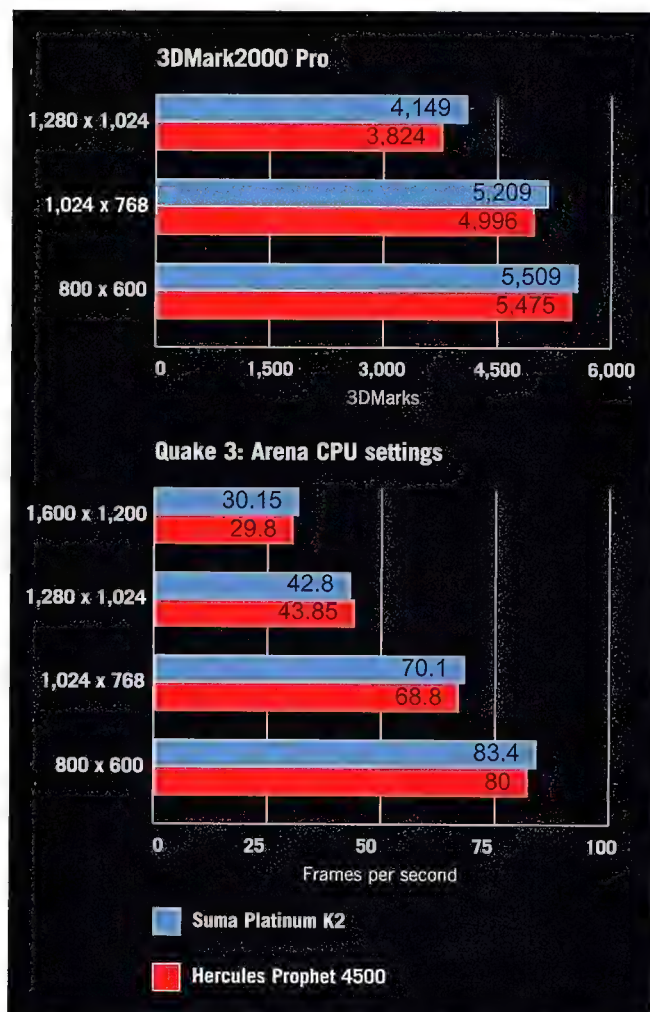
John Gillooly tries not to blow the budget on video hardware.



The KYRO II hit the scene with a big blast a few months ago, bearing the tag of 'GeForce2 Ultra beater' after success in one or two tests on a reputable hardware Web site – an impact that slowly faded as the general attention shifted towards the emerging battle at the high end of the graphics card market. In fact, quite a few people almost instantly dismissed the KYRO II as an interim step between the poor performing KYRO and the rumoured all-singing, all-dancing T&L-powered KYRO III.

The price for KYRO II cards is starting to come down. The Suma Platinum K2 has a very competitive price when lined up against the clutter of budget cards that are currently on the market. In terms of performance, the KYRO II sits at a similar level to the GeForce2 GTS/Pro in games that don't use hardware T&L, but slips behind in T&L-enabled games.

'The trade-off is noticeably better image quality and colour richness than the competing NVIDIA solutions . . .'



The trade-off is noticeably better image quality and colour richness than the competing NVIDIA solutions alongside fast 32-bit colour performance and potential performance boosts in those games that have large amounts of overdraw due to STMicroelectronics' use of tile-based rendering technology in the chipset.

Suma has provided a no-frills solution in the Platinum K2. The card looks nice but bleak, with the glossy black PCB obviously borrowed from a member of the GeForce family. There's also a good-looking but rather cheaply constructed silver heatsink/fan combination to cool the core. Because the tile-based rendering technique used by the KYRO II is very memory efficient, the RAM runs at the relatively low speed of 175MHz.

Atomic tested the KYRO II using our 1GHz Athlon testbench and compared the results to the Hercules Prophet 4500 graphics card. Both cards feature 64MB of SDRAM and show a similar level of performance, with the Suma edging ahead in most tests, due to a slightly later driver revision used for the Suma. The differences aren't fantastic, but the Platinum K2 has one big advantage in that it is significantly cheaper than the Hercules Prophet 4500.

While it will never even come close to the bleeding edge of video cards in terms of features, the Platinum K2 is both cheap and fast. In games that use hardware T&L (of which there is a slowly increasing number) the GeForce2 GTS cards will be faster. But for other games, this is a great way to save some money without compromising raw frame rates. Definitely a no-frills card, but by no means a slacker in the performance stakes.

SPECIFICATIONS

STMicroelectronics KYRO II chipset, 64MB 128-bit SDRAM, 15-pin D-Sub output, bundled with drivers and KYRO demos

Web site: www.e-pc.com.au Price: \$299



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Philips A3.500 speakers

Matt Overington looks at Philip's take on I3375P34K.



Philips has an extensive history in both PC and audio components, and has a reputation for producing high-quality, reasonably priced components across a wide range of industries. The A3.500 is a surround sound package designed for computer use, and features a standard set of four satellite speakers and a subwoofer. The speakers and subwoofer run at 80W RMS, and are loud enough for computer use.

Housed in an attractive grey box, the 40W subwoofer uses suspension to mount the front of the subwoofer to the case, which is designed to give more accurate bass response than a standard mounting. Philips has dubbed the suspension method wOOx, and the bass provided by the system is extremely rich and solid, although some distortion is still noticeable at extremely high volumes. The subwoofer also serves as the main connection point for all the cabling, and sockets are provided for the inputs, satellite speakers and an IR sensor for the included remote control.

... the bass generated by the small subwoofer is very rich ...

The four bundled satellite speakers are extremely flat, and can be mounted on either a wall or using small mounting stands that are supplied. The speakers are extremely light, and while their high-end response is outstanding, they are lacking detail in the mid-range. You can correct this to an extent by running equaliser software, but this is somewhat of a hassle. The cables for the speakers are extremely long, which means you can run them a long way from where you are sitting, enhancing the surround sound effects.

One excellent feature of the A3.500 is the fact that the IR sensor is mounted on a cable. This means you can attach it to the top of your monitor or PC case, so if you want to turn down the volume when you're watching a DVD, you can point the remote control at the most obvious place – which is where you

are looking. The remote control has good range and works efficiently from a range of angles. Bass and treble controls are also included on the remote control, which means that you can perform some equaliser adjustments without resorting to using software applications, although the range is limited.

Where the A3.500 falls down is its lack of a digital input. Although two stereo inputs and a surround sound input are provided, many sound cards and DVD players are designed with digital output, resulting in higher fidelity sound when compared to analog versions. The majority of subwoofer packages that are available do feature digital input, but it drastically adds to the cost of the speakers.

This speaker kit is ideal for gaming, as rumbles, gunshots, explosions and other gaming effects sound excellent. But while the A3.500 is a good surround sound package for gaming, the lack of digital input and the limitations of the speakers mean that it is not ideal for watching DVDs. Unfortunately, the speakers are not great for listening to music either, as the mid-range of the system is lacking. Even though you can connect your sound card, MP3 player and CD player to the same speakers using the three inputs, the lack of a digital input means that the audio will never sound as good as it could.

Where the A3.500 really performs is its bass response. Philips' wOOx system works extremely efficiently, and the bass generated by the small subwoofer is very rich, which is really appreciated in first person shooter gaming, as grunts, gunshots and rumbles sound outstanding. If you are using an analog sound card that is capable of surround sound, and you are after speakers to complement the card, then the Philips package is a worthy choice. If you have digital output, though, you are best off looking for a surround sound speaker set that can make use of it.

SPECIFICATIONS

80W RMS, 40W subwoofer, four satellite speakers, remote control and moveable IR sensor, three inputs (two stereo and one surround)

Web site: www.philips.com.au Price: \$349



Acer FP581 TFT

Ashok Zaman likes doing it flat style.



There is absolutely no doubt that TFT (thin-film transistor) displays are much easier on the eyes to look at. While CRT (cathode ray tube) displays give the feeling that the image is beamed directly onto your retina, a TFT has a more passive feel, making it easier to look at. This fact alone is motivation enough for many people to switch over to TFT, especially if you are staring at a screen for most of your waking hours. The other obvious advantage is the exceedingly small footprint – you no longer feel that you have a primitive beast parked on your desk.

To this end, the Acer FP581 has it all. Aesthetically, this TFT display is a groovy little piece of work, with the 15in viewable display mounted within a smoothly rounded bezel and chrome finish. The lower bezel presents the OSD interface as an array of five buttons, including Acer's own 'i key' on the left, which will automatically calibrate all the geometry, luminance and colour settings for an ideal balance. In most cases it will do a better job of this than you can ever hope to achieve by manually adjusting everything yourself. Those with enough patience to manually adjust everything themselves, however, will be greeted with a simple and intuitive interface. Also included are two small speakers, which offer nominal sound.

The native resolution is 1,024 x 768, which is also the maximum screen resolution. The image is crisp and reasonably sharp, though, as with most current TFT screens, the clarity does not quite match the quality of a decent CRT monitor. Dropping to 800 x 600, the Acer resorts to all manner of trickery to render the screen using interpolation techniques. This results in a fairly noisy and pixellated image. This is one of the drawbacks of TFT displays when deviating either way from the native resolution. For most people 1,024 x 768 is standard, so this should not present a problem, and as far as TFT displays go, the Acer FP581 has a lot going for it. The stated viewable angle is 75° from the centre or 150° all up, and in practice it actually seems better than that.

Running the FP581 through the rigours of DisplayMate, it proved itself more than capable. Near-perfect screen geometry – an advantage TFTs have over CRT – and solid screen uniformity, where the image intensity is balanced across the display, are combined with excellent white balance and contrast. Whites appear clearly defined against varying greyscale intensity block without over-saturation. Likewise, greyscales against a black background reveal well-balanced brightness and contrast. Pixel tracking and timing tests revealed some modulated pulsing of the image against finely dithered gradients, the noise fluctuations revealing a little trouble mapping the fine-grained image accurately against the actual physical pixels of the screen. Overall, though, this TFT display comes close to matching the quality of those put out by the big players such as Sony or NEC.

As for suitability, TFT displays are not for everybody – yet. Gamers, and those who demand absolute clarity of image when working with and manipulating graphics, may find the pixel response time a little off-putting. Despite the excellent response time of the FP581 at 35ms, it is still very noticeable with a slow 'on-off' time with regard to movement. This results in ghosting and fading effects when moving the mouse, scrolling down a Web page and, of course, playing games. Perceptually, CRT monitors have a near instantaneous response time and are thus able to maintain a crisp image during motion. For code monkeys and desk jockeys, or as a second display next to the CAD analyst's 21in flat CRT, however, the Acer is ideal. Your eyes and wallet will love you for it.

SPECIFICATIONS

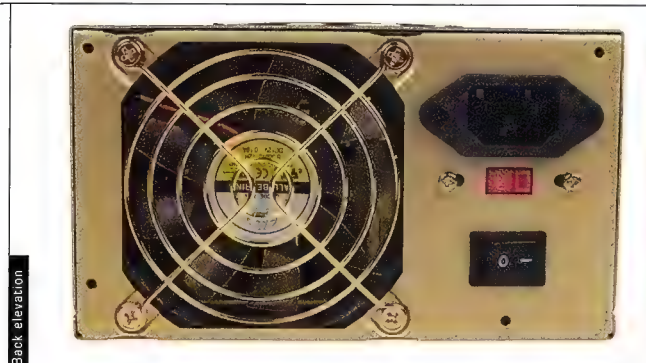
15in TFT screen, 356 x 382.8 x 202.1mm, 75° viewing angle, D-Sub connector, line-in, native resolution 1,024 x 768 at 32-bit colour, response time: 35ms

Web site: www.acer.com.au Price: \$1,299





Topower Top -420W PSU



Back elevation

This unit from Topower is impressive. To start with, the unit is gold in colour. Although this is not as stylish as the classic dull silver appearance of power supplies from days gone by, it does have a certain elegance about it. The connectors inside the plugs are gold plated, and in theory this provides a better connection between points.

The dual thermostatic fans are protected by removable grills rather than being punched out of the casing, and are very quiet. It is actually less noisy than a single-fan 300W power supply. There are also gold anodised heatsinks nestled inside.

There is no monitor power connector present, but the red voltage selector is there (you know, the one you should never ever play with). The unit does have its own power off switch, which is a blessing should you be unable to shut down normally.

There are a total of 10 Molex connectors and two floppy drive connectors. The leads are about one metre in length. This either increases that tangled mess you may be used to or makes it easier to run the cables around the edges, improving the appearance and the airflow inside your case. There is also an auxiliary connector, which is required for many servers or dual-processor-capable motherboards.

We threw this gold nugget into a system that has an overclocked Duron, two 7200rpm IDE hard drives, a high-end video card, sound card, two NICs, a DVD player, a CD-RW drive, Super Orb, Blue Orb and four system fans.

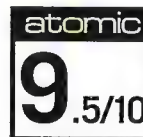
Breaking out the ol' trusty multimeter, the unit showed no signs of struggling under full load. The +3.3V signal was fairly constant and ran at about 3.5V. The +5 signal sat happily at 4.94 to 5V, which is quite acceptable. Even the +12V, which doesn't perform so well in cheaper units, hovered happily around 12.09V. While running all devices there was no apparent drop or change in the consistency of the power output.

This is a slick unit, and 300W is nearing the edge of its potential with 1.5GHz and higher CPUs and multiple devices in the case.

SPECIFICATIONS

420W ATX power supply unit, gold cover, twin translucent fans, anodised aluminium internal cooling fans, ten Molex connectors, auxiliary connector

Web site: www.auspcmarket.com Price: \$180



DR-100 System DeHumidifier



Top elevation

End elevation

OK, this one's got us. This is a device that claims to keep the internal humidity levels of your PC down. Down where, exactly? Now, unless you live in the tropics during monsoon season, or you've got some girl in a singlet and shorts spraying down your PC innards with a hose, how much moisture are you likely to have? Granted, a Peltier can cause some condensation, but this is usually local to the Peltier and is not floating around freely. If

you using water cooling, then it should be well sealed.

The makers of the Just Cooler DR-100 System DeHumidifier want you to believe that the DeHumidifier's built-in heater 'heats up the water mist on the Natrium particles (absorbent), which allows the fan to expel the moisture'. *Astonished look* Huh? Did he say 'heater'?! *Astonished look*. We're not comfortable with any device that adds heat to a system.

If they tell us that humidity will cause corrosion and rust to components, then sure, we'll buy that. But there must be a better way of preventing it than with a device like this.

All this aside, installation is simple, but you will have to sacrifice at least one whole expansion slot on your motherboard. The Molex connector is a pass-through type. The fan, which spins at 3,500rpm and moves around 18cfm (cubic feet per metre), is reasonably quiet.

We're sure this unit does exactly what it says it does, but why would you need it to?

By the way, 'Natrium' is a fancy Latin word for Sodium, but we had to look that up.

SPECIFICATIONS

MBTF: 20,000 hours; fan speed: 3,500rpm; airflow: 18cfm; voltage: DC-12V; power: 1.44W; dimension: 220 x 120 x 23mm; heater (ugh): 2W (maximum); DC: 12V

Web site: www.auspcmarket.com.au Price: \$66



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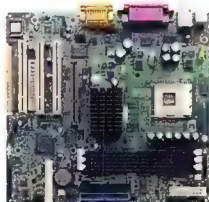
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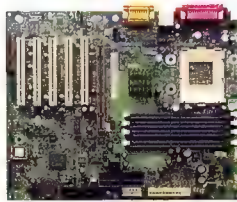
Intel 845



MX4BS

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- Support PC133 / PC100 SDRAM to 3GB
- Intel 10/100Mbps LAN onboard
- IDE 33/66/100 support
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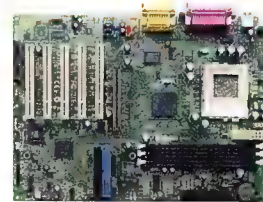
Intel 850



AX4T

- Intel 850 chipset for socket 423 P4
- Support PC800 RDRAM to 2GB
- Intel 10/100Mbps LAN onboard
- IDE 33/66/100 support
- 3D Audio onboard

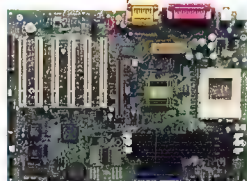
Intel 815E B-STEPPING



AX3S-U

- Intel 815E B-stepping chipset for all PIII CPU
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- 4X AGP Port
- IDE 33/66/100 support
- 3D Audio onboard

Intel 815EP B-STEPPING



AX3SP-U

- Intel 815EP B-stepping chipset for all PIII CPU
- 4X AGP Port
- IDE 33/66/100 support
- 3D Audio onboard

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GlobalWIN CAK38 HSF



In last month's Atomic heatsink and fan combo round-up, the plain aluminium GlobalWIN WBK38 astounded us all by coming equal first with the all-copper, all-beast ThermalRight SK6, a result that no-one could have predicted. How on earth could a vanilla aluminium heatsink perform just as well as this towering chunk of glistening copper? We concluded that it all came down to the traditional yet reliable GlobalWIN design of the cooler. So you can understand our excitement when we got hold of GlobalWIN's latest heatsink fan, the all-copper CAK38. Isn't it funny that when you've set your hopes high about something, it generally tends to be a bit of a disappointment? The CAK38 was no exception to this trend.

In terms of appearances, the CAK38 certainly looks the biz. The entire heatsink is made of copper, which accounts for the heavy weight of just over 500g. Strapped on top of the traditionally shaped square heatsink is a 6,800rpm GlobalWIN

uber fan, and as a result it's just as noisy as the infamous FOP38. If you like to leave your PC on all night, and it happens to be situated in the room in which you sleep, you're going to have to be a heavy sleeper or incredibly drunk to put up with the racket this heatsink fan creates.

To compare the performance with the WBK38, we attached both the CAK38 and the WBK38 to an A7V133 motherboard with a 1.2GHz Athlon Thunderbird in place. So don't expect the results to be directly comparable to last month's round-up. This is why we tested the WBK38 again. It must be noted that the clip on this heatsink fan was rather stiff, but isn't anywhere near as difficult as some of the other designs floating around.

Both heatsink fans reached identical temperatures, regardless of whether they were under load or not, with a load temperature of 55°C and an idle temperature of 52°C.

Considering that the CAK38 is almost double the price of the WBK38, we simply can't recommend it, unless you've got a hankering for a new type of metal to be seen through your perspex window.

Once again, it seems the notion that copper is the ultimate affordable material for heatsinks is about as truthful as saying Macs are a better buy than a PC.

SPECIFICATIONS

500g, 6,800rpm fan, all-copper heatsink. Noise level: 46.5dB(A); air delivery: 37.6cfm (cubic feet per minute); input power: 3.84W

Web site: www.auspcmarket.com.au Price: \$90



Agilent ArctiCooler HACA-0002



This cooler comes from the same people who brought the original Orb coolers for HP machines to the market. With this kind of heritage the HACA-0002 is the latest refinement of this design, and looks absolutely tiny compared to many of the behemoths that are available. In fact, it's even smaller than the smallest Thermalright Orb heatsink fan, with the exception of the Blue Orb, which is only for chipset cooling anyway. It is also one of the lighter heatsink fans available, weighing a meagre 170g, so it won't be putting any of the strain on your motherboard that the all-copper momma's do.

The clip for this heatsink fits very well into the category of 'Athlon cruncher'. It's incredibly tight, and even we were scared that our CPU core would go bye byes after fitting this cooler. In

fact, it looks as if it is physically impossible to fit the clip without snapping a small section of it. This is a problem many have encountered, including us.

When we fired up the ArctiCooler, the first thing we noticed is how darn quiet it is. Quite simply, it is the quietest fan we've ever barely heard. So it's cheap, small, light and very quiet. Oh yeah, one other thing – it's a piece of crap.

Rated to handle up to a 1.4GHz Athlon, the HACA-0002 couldn't even handle our 1.2GHz Athlon. We watched in amazement as the temperature soared past 60°C, reaching 67°C before the computer crashed. We usually run the SiSoft Sandra CPU burn-in mode for 30 minutes before taking the load temperature. The HACA-0002 lasted all of about three minutes before sending the CPU into the lost kingdom of crashes. After removing the heatsink, the TIM hadn't even melted, showing that the heatsink base didn't even make contact with the CPU, regardless of the incredibly tight clip. Need we say more? Avoid this cooler unless you enjoy the smell of frying silicon.

SPECIFICATIONS

Weight: 170g, dimensions: 63 x 34mm, 4,000rpm fan, Orb design, aluminium alloy construction, 3-pin power connector

Web site: www.agilent.com Price: \$35





Cold Cathode Light Kit



And they say size doesn't matter . . . pft! The Cold Cathode Kit by PCMods lives up to its promise and without a doubt gives you brighter and sharper light than a standard neon tube in a much smaller package. The cathode itself is only about one eighth-of-an-inch thick. In fact, including the protective acrylic case around the light, the whole unit is not much thicker than a pencil. It certainly won't take up precious space inside your case, and it is unobtrusive enough that if you don't switch it on, you hardly notice it's there.

With this kit, you're going to put out enough coloured light to seriously annoy the guy next to you at a LAN party, which is a good thing or a bad thing, depending on how big he is. The version reviewed here glows a very bright green, but is also available from PC Case Gear in blue. There are also yellow and ultra-violet versions available.

The Cold Cathode is supplied with a square bezelled on/off switch, which, depending on your case-modding deftness, shouldn't be too difficult to install. The length of the leads to the switch does restrict you a little in terms of where you can locate it, depending on the size of your tower, but it isn't that much of an issue. You could even mount the switch at the rear of your case without difficulty, if that is more appropriate.

The kit comes prepared with velcro strips, and a pass-through Molex connector, so setup for most will be a no-brainer. In a smart move, with an eye on the possibility of short circuits or other damage, the 12V inverter has been moulded with a non-conductive, rubber-like material. This also has its own strip of velcro and, because of its size, it can be tucked away discreetly – a small but important factor when creating a nice, clean case mod.

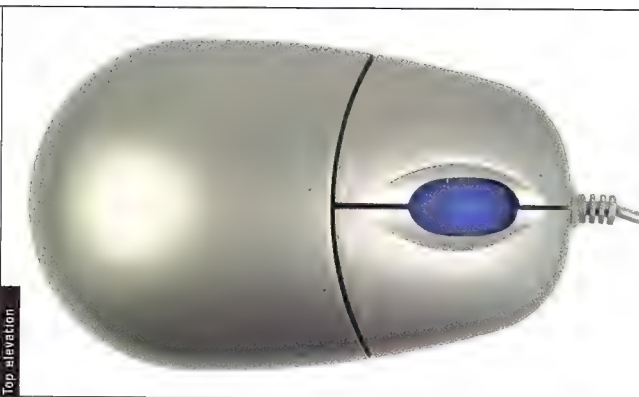
There is nothing we could find to complain about here. The Cold Cathode Light Kit is better than any of the other dozens of neon lights on the market in terms of size, output and ease of installation. As an added bonus, these cathode tubes have a life expectancy of up to 20 years. But like almost anything in life, if you want the best you gotta pay for it. This kit costs around double that of a standard neon light. Do what you have to and get one!

SPECIFICATIONS

Length: 12.25in, diameter: 0.25in, 100% acrylic shell, 360° of pure light, 12V inverter (coated for safety), Jam-Nut, square bezel, on/off switch, Molex connector
Web site: www.pccasegear.com Price: \$89



Swann Opti-Glo Mouse



The Opti-Glo mouse from Swann is a pretty little thing. It is a standard optical mouse with two differences. First, combined with the traditional red glow from the base of an optical mouse, the scroll wheel itself is lit with an eerie blue light. For no good reason, both of these lights become brighter when the mouse is actually in use.

Second, the mouse itself is incredibly small. We had trouble getting a comfortable hold on such a small device, although children, or other people with smaller hands, would no doubt prefer this size. The mouse is symmetrical, so it is suitable for both left- and right-handed users.

Installation of this USB mouse was standard. It comes with a floppy disk containing a custom driver, although it is not required for basic operation under Windows Me. If you do use the supplied software you will be able to adjust your mouse settings via an icon in your System Tray. You will also get an extra feature, which allows you to use your scroll wheel as a zoom tool for a small selection of your window, whether it be text or image. While this function is cute, it is not terribly useful. We also found that after removing the Opti-Glo and reinstalling an old PS/2 mouse, this feature still worked.

To check how responsive the mouse's performance was, we fired up a game for a spot of online shooting. We're happy to report that the mouse did its job well. There didn't appear to be any of the lag or stuttered performance we have experienced with other optical devices; however, Bennett's Counter-Strike skills still were seen to suck badly, and his hand cramped after about half-an-hour due to the awkward size of the device.

In case you forget how to use a mouse, full instructions are included in the box.

SPECIFICATIONS

Three-button operation, 1,500sps (signals per second), 1 million cycle life micro-switch, one free USB port. Requires: Pentium 200MHz MMX, 32MB RAM, Windows 98
Web site: www.swann.com.au Price: \$49.95



Belkin Gold Series cables



strength and rigidity. Grip is excellent, as the rubbery surface is contoured for your fingers. These cables feature Tactilite moulded strain relief, which in plain English means that the wire body and connectors are joined through several sub-segments, so you can pull the plug by the cable without fear of the socket flying out.

The printer cables are similar in construction quality, albeit the wiring is thicker. This may be due to the double shielded layer, which Belkin claims reduces electromagnetic interference. The gold-plated pins proved fairly sturdy while they were abused with a Swiss Army Knife, as are the oversized thumb screws. Segment joints between the cable and socket are loose in comparison to the USB cables, but still pull-proof.

What can I say? They are nice cables. But at the end of the day, there is no tangible benefit that would justify buying these just to replace your old ones. The gold plating is a nice aesthetic touch, but no-one is going to pull their cable out just to admire its beauty. Besides, today's stainless steel connectors are equally resistant to corrosion.

SPECIFICATIONS

24K gold-plated connectors, 6in/1.8m cable with PVC/rubber housing, lifetime warranty

Web site: www.belkin.com

Price: \$34.95 (printer cables); \$29.95 (USB cables)



While CPU speed has doubled in digits in the last decade, cables are still boring plastic tubes clamped by sub-par connectors, unlike their almost ridiculously over-engineered home audio counterparts. Belkin obviously recognised this and came up with their improved Gold Series cables. The connectors are plated with a thin layer of 24K gold. Gold not only looks and sounds impressive, but it is also one of the most conductive metals and is resistant to corrosion. The 1.8m cables are encapsulated in a flexible PVC coating, which results in a very rubbery feel.

Construction quality is top notch. The gold connector ends are molded in a jigsaw-interlock fashion that increases structural

Perspex Window/Sticker Kit



Installation is no cheesecake for those who hate drilling through code metal, but otherwise there's no real catch. Make sure you give the perspex a good clean before mounting and have all necessary tools by your side. When drawing the outline with the washer, make absolutely sure that your trace is perfect. One mistake here will result in a load of misery later on. After you've drilled the hole and nibbled away the outline, take your time to nudge the window into the rubber molding. This part may get tricky, but being a synthetic polymer, perspex can bend to some degree without degradation.

To finish off the cosmetic transformation, PC Case Mods offers you special stickers at a discounted price. Some popular designs include Biohazard, Radioactive, High Voltage and the pinnacle of political incorrectness, the outline of an over-slim, underdressed and highly exaggerated female figure.

At the end of the day, this decent sticker kit is all you need to add an alpha channel to your case panel. After seeing the mod with a decent-quality neon, there's no going back. The stickers provide the extra 'wow' factor and their authenticity is quite commendable. This kit is a good start for anyone considering case modding.

SPECIFICATIONS

22cm x 28cm laser-cut perspex with rounded corners (4cm radius). Includes washer and rubber moulding.

Web site: www.pccasemods.com

Price: \$23 (discountable stickers \$8.80 each)



If your house has windows, why shouldn't your computer have them? Don't know where to start? With the all-in-one Perspex Window/Sticker Kit from PC Case Mods, your last remaining excuse has just died.

The window measures 22cm x 28cm with rounded corners. The cut job on the cast-acrylic perspex is perfect, courtesy of the highly accurate laser cut. A washer is included to help you trace the outline before the installation, and a fine tube of rubber moulding is provided for the final fit.



games

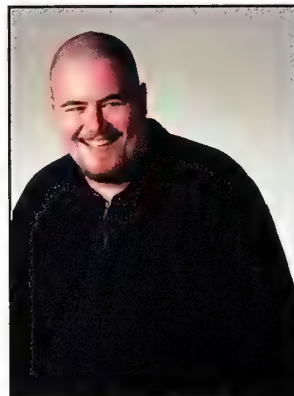
Eerie expanses of icy knobs

It only hit me recently. I have a problem. The symptoms include sleep deprivation, not eating and an overwhelming desire for often insane amounts of caffeine. Yes, my name is John and I am an addict.

The culprit is Gran Turismo 3 (GT3). That evil piece of rounded plastic has caused me untold grief since it was released, and there is no end in sight. I feel that I have finally found my purpose in life – to achieve that illusive 100% completion of the game, no matter what it takes.

It is not that I am new to the evils of gaming addiction. Nope, this is not the 'This game is fun, I think I want to finish it' craving, but the full-blown domination of your life that makes you play a game solidly for months (or even years) on end.

The previous culprit was Counter-Strike (before it descended



'The graphics will suck people in, but the gameplay is what will give the game its legs.'

into the petty bitchfest that it has become). My personal experience on the Counter-Strike (CS) servers was playing for several hours a day over a period of about one-and-a-half years, with the only respite being the occasional business trips that took me away from the precious Internet for days on end.

Mathematically speaking, if we assume a modest three hours of CS per day, ignore LAN events and extended weekend sessions, then that works out to at least 1,800 hours spent on one game. If you were a student at the time, double this figure. That is a fairly huge chunk of one's life spent playing a very simple game.

I think that Counter-Strike is one of the best examples of somewhat pointless addiction, because it is all skill (or at least used to be). The maps didn't change much, the guns only varied slightly between betas and there was none of that class-based crap to deal with. Of course, this all becomes clear in hindsight, but when you are trying to shave precious milliseconds off the perfect rush you are lost in the moment and nothing else matters.

And that is the crux of this issue. A truly addictive game sucks you right in. From the outset, even if the odds are against you and you don't have the skills to pay the bills, you just want to keep playing. Gran Turismo 3 has got me in the same way. Initially you get overwhelmed by just how amazing it looks, then you get sucked in by how good the physics modelling is, then by the realistic engine sounds and the fact that little tricks like slipstreaming work. The next thing you know you're having a stand-up screaming match with your flatmate about what kind of limited slip diff you want to put into your heavily worked Beatie.

Once the black eye goes down and you patch up your various injuries, you sit down and keep playing, forgetting all the pain of the past, and move on. It really is an intense

compulsion that makes the difference between a great game and one that you tell complete strangers on the train about.

What amazes me is that GT3 is not some boutique cult hit. It is the PS2's first major title. The sheer weight of marketing behind the game means that it has and will continue to spread like wildfire. Hopefully, it should not just be a landmark title for Sony, but a landmark title for gaming in general.

What will make this possible is the graphics engine. It has to be seen to be believed. Sony is highly aware of its game's attraction, and has made a very bold move in its television advertisements by using in-game footage exclusively. This is a big change from the tendency to fill an ad with cute little fluffy animals and then strobe a few seconds worth of in-game footage at the end of it.

The graphics will pull people in initially, but the gameplay is what gives the game its legs. GT3 has perhaps the perfect game design – a factor that has committed big PC games like Quake to the common consciousness and driven the lives of Quakers into the quagmire of life-wasting addiction.

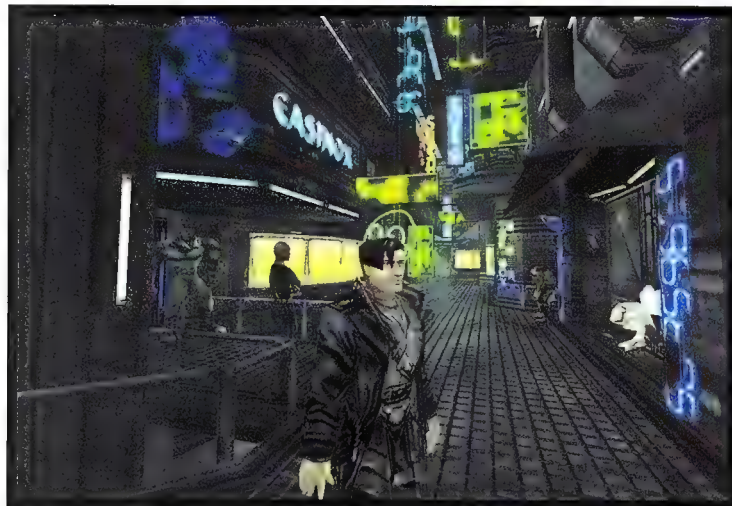
GT3 owns me at the moment. My PC will never forgive me for the neglect I have shown it over the past few weeks (it seems to be BSODing more often of late), but I am happy. Or maybe that's just the game talking.

John Gillooly

□

Anachronox

Bennett Ring checks out at Ion Storm's greatest game since Daikatana.



① Sly Boots decides to try his luck in the Casinox area.

Anachronox isn't a very nice place to live, being an abandoned alien city taken over by the roughest and toughest squatters this side of Alpha Centauri. The city happens to be inside a massive sphere that was created by the departed aliens as a kind of intergalactic public transport system, allowing instant travel to different spheres within the galaxy. You play the part of Sly Boots, a down-and-out human who sidelines as a wannabe Sherlock Holmes.

This game is based on some rather old technology; it uses an enhanced version of the Quake 2 engine, which is now approaching its fourth birthday. Thankfully these enhancements to the engine have stopped it from looking like a two-bit re-release of an old game. The environments still look a little blocky, and there aren't the super-high-resolution textures that most new 3D engines utilise, but these are offset by highly detailed character models with beautiful lip synching, as well as an amazing new particle system that is used widely in both combat and general atmospheric effects.

Because the various elements that combine to make a level using the Quake 2 engine are low in polygons and texture detail, the designers have been able to utilise the power of current PCs to build scenes much larger than those ever seen in Quake 2. The end result is levels that really do capture the feeling of life within a giant metallic sphere.

Anachronox is firmly entrenched in the RPG genre, and faithfully sticks to the conventions this genre has established. There is the standard experience points system, with each member of your party gaining points as their experience in certain areas grows, which usually occurs after knocking a few ruffians out. As you continue on your quest extra characters join your party, allowing you to take on even bigger bad guys and more complicated tasks. Each of these characters has a special ability known

as a WorldSkill, such as the ability to pick locks or use their voice as a weapon.

Combat takes place in a semi-real-time manner, with each character having a recovery time counter. This takes about 15 seconds to fill before each character can move, attack, use an item or use a special ability again. Each character also has an NRG meter that is drained when certain moves are attempted, as well as a separate Bouge meter for WorldSkill moves. NRG stands for Neutron-Radiated Glodents – radioactive rats who supply power for many of the items within the game – and this type of humour is prevalent throughout the game.

Most RPGs aren't the quickest games around, but Anachronox is even slower than RPGs of the past – especially for the first few hours. The task of running from one side of a level to the other to fetch something is repeated far too often, leading to some very tedious gameplay. Things do start to heat up a bit further into the game, but even then the pace might be a bit slow for many. The dialogue also comes across as amateurish, with an odd sense of humour that I for one didn't find to be side-splitting. Worse still is the fact that most of this dialogue is presented as onscreen text, with voice acting only used for the more important scenes. Considering the vast amount of dialogue that takes place, and the tight lip synching that the engine is capable of, this ancient text-based technique is unforgivable.

The slow pace of the game combined with its niche humour will make you either love it or loathe it. Those who are desperate for a futuristic 3D RPG might appreciate the style of gameplay, but most gamers will find it dated and dull.

GAME DETAILS

FOR: Large open levels with lots of Blade Runner-style neon, one of the lengthier games to be released of late, unique sense of humour.

AGAINST: Extreme lack of voice acting, tedious beginning, unique sense of humour.

MINIMUM REQUIREMENTS: Pentium II 266MHz, 64MB RAM, 8MB 3D accelerator with OpenGL support, 4x CD-ROM drive

RECOMMENDED: Pentium III 700MHz, 128MB RAM, GeForce2 MX, 16x CD-ROM drive

SOUND APIs: DirectSound

VIDEO APIs: OpenGL

DEVELOPER: Ion Storm www.ionstorm.com

PUBLISHER: Eidos Interactive www.eidos.com

DISTRIBUTOR: OziSoft www.ozisoft.com.au

Onimusha Warlords

It's time to put away the chopsticks and bust out your Katana with Bennett Ring.

If you've ever played a few games on the original PlayStation, the odds are fairly high that you've played Resident Evil. And the odds are probably even higher that you liked it. Its beautiful yet gory take on the Alone in the Dark-style of storytelling saw it instantly rise to the ranks of PlayStation classic.

Onimusha is Resident Evil all over again, but set 400 years in the past, in the land of (badly dubbed English) feudal Japan.

You play the part of Samanosuke, which sounds exceptionally hero-like when said out loud. His quest to save a princess who has been kidnapped by demons is explained by one of the greatest game intros ever known to man, which also revolves around two huge armies facing off Braveheart style. This intro actually won the 'Best of Show' award at SIGGRAPH 2000, an annual exhibition of computer-generated design that showcases the world's best.

Onimusha uses pre-rendered backgrounds with polygonal 3D objects and characters. This allows the developers to create detailed backdrops populated by creatures with high polygon counts, without demanding too much performance. It also means that the camera views are fixed. The best way to describe it is to imagine that each room you step into has several security cameras on different walls. You are presented with a view from one camera at a time, and the camera view used is dependent upon your position in the room.

While this lends itself to creating dramatic and suspenseful camera shots, it can cause problems when a bit of onscreen biff takes place. If the creature you're currently trying to dissect happens to be just out of camera view, because it's in a different part of the room to you, blocking its incoming tentacles/battleaxe/acid mucus can become a bit of a hassle. It's a problem that has plagued Survival Horror games ever since Resident Evil was released. In this wonderful world of 3D everything, I'm starting to wonder if pre-rendered backgrounds will soon go the way of 3dfx. It also means that there is usually a couple of seconds of loading time between each room, as each possible backdrop gets dumped into the PS2's memory.

Once you've learnt to make sure you're in the right spot before the blood starts to flow, you will soon begin to appreciate the intricate detail of the character models, some of which are spine-tinglingly evil. This level of detail is complemented by brilliant motion capture work, and the end result is some of the prettiest, and goriest, sword fights to be seen on the small screen. To help you out when the swords are a clangin', holding down the R1 button will see Samanosuke automatically face the closest target, allowing you to bring down a barrage of combo sword swipes using a few simple button presses.

I could devote a whole page to the music within



Onimusha and still not do it justice. Courtesy of the 200-piece New Japan Philharmonic Orchestra, Onimusha has one of the most hauntingly beautiful soundtracks heard in a game. If it is released separately on CD it'll find a place in my collection.

Unfortunately, you'll get through the game in ten or so hours, and there's little incentive to check things out again once you've completed it. How can one of Capcom's most costly games also be one of its shortest? The inadequate length of the game will no doubt leave many rather upset that it's all over so fast. It does make a great rental title, though ;)

Before you complete the game there is no denying that Onimusha shows what the next generation of Survival Horror titles are capable of. Let's just hope that all of these games aren't of the type that can be completed in a day. □

❗ You can't deny this game looks nice.

GAME DETAILS

○ **FOR:** Detailed undead creatures who splatter realistically, spine-tingling soundtrack, intense action scenes – one of the few good PS2 games.

○ **AGAINST:** Pre-rendered backgrounds are non-interactive, extremely short game length, cumbersome camera views.

MINIMUM REQUIREMENTS: PlayStation2 console, analog controller

RECOMMENDED: Memory card

DEVELOPER: Capcom www.capcom.com

PUBLISHER: Capcom www.capcom.com

DISTRIBUTOR: THQ www.thq.com.au



atomic

8/10

Shogun: Total War Warlord Ed.

Des McNicholas shows how to make a game with a daikatana and not balls it up completely.



i The sheer scale of the historical battles is quite remarkable – no Tesla coils among this lot!

Released in 2000, the original Shogun: Total War was a surprising hit in the generally uninspired strategy genre. Developer Creative Assembly justifiably won a number of awards for its efforts, and the Shogun: Total War Warlord Edition has tweaked an excellent product up another couple of notches. Those who own the original game can get all the improvements by opting for the Mongol Invasion expansion pack, but newcomers should head straight for the Warlord Edition.

Warlord offers a first-rate mix of historical battles, campaigns and multiplayer action, supplemented by straightforward map and campaign editors. Each of the original campaigns is included, as are those of the Mongol Invasion expansion pack, and a small number of new units add some interest to the battlefield antics. The action now spans four centuries and focuses on the key political and military leaders of the times, including Japan's three great 'unifiers' and the marauding Kublai Khan. Despite the increase in scope, Warlord successfully maintains a strong feeling of historical accuracy and atmosphere, while rounding the whole thing out with an interesting hypothetical campaign based on the Khan's ill-fated second invasion.

Shogun's impressive strategic interface has been retained, from which armies, emissaries and spies are dispatched, and players will have no difficulty staying on top of the big picture. The Japanese campaigns still have the traditional RTS focus on construction and technological advancement, but the Mongol campaign and new historical battles add the option of real-time combat without the need to worry about resource management. This will be a very popular approach with those veterans impressed by Shogun's stunning portrayal of combat, and the custom battle option takes it one step further by giving players more control. Multiplay has been improved, with six new game types ranging from Last Man Standing to Survive the Siege.

Warlord has a well-designed interface, using a combination of formation orders, shortcut keys and unit buttons. Unit flags help them to stand out from the melee, and a simple right-click brings up individual command options. Both friendly and enemy AI seem to have been improved since the original release, and units tend to react as you would expect in the heat of battle. Some stand, some run and others just seem wholly confused! Given the number of units onscreen, it's not surprising that selection is a little fiddly at times, as is sorting out facing. In practice, players will tend to concentrate on positioning units at the appropriate time and place in the early stages of a battle, leaving the detail to the AI and a set of general formation orders. Once things hot up, a more hands-on approach can be taken.

While not providing a major improvement to what was already good to look at, Creative Assembly has upped the detail level of most units, resulting in a much sharper perspective of the game's large formations. The terrain over which they fight is still a little bland at times, but sufficient detail is provided from a tactical perspective, and most of it gets hidden fairly quickly by the thousands of troops that take part in some of the battles. Additional buildings and scenery have also been provided, particularly in coastal regions, and the overall appearance of the game has been given a polish.

Shogun: Total War Warlord Edition retains the basics of the original, while introducing significant improvements. Despite the fact that the basic game is a few years old, it hasn't been bettered as an historical strategy title, and the focus on real-time combat should make it a winner all over again. □

GAME DETAILS

FOR: Great blend of strategy and tactics, and an excellent choice of missions.

AGAINST: Some bugs in the tutorial, a few minor control problems and a relatively poor mix of new units.

MINIMUM REQUIREMENTS: Pentium 266MHz, 64MB RAM, 650MB hard disk space, 8MB DirectX-compatible video card, Windows Media Player

RECOMMENDED: Pentium III 450MHz, 128MB RAM, 1.8GB hard disk space, 32MB video card

SOUND APIs: Direct Sound

VIDEO APIs: Direct 3D

DEVELOPER: Creative Assembly Interactive

www.totalwar.com

PUBLISHER: Electronic Arts www.ea.com

DISTRIBUTOR: Electronic Arts www.ea.com



ATV Offroad

Des McNicholas does some serious quad damage.

In *Motocross Madness*, developer Rainbow Studios struck a good balance between realism and fast-paced arcade action, while bringing some pretty impressive graphics to low-end PCs. Its PlayStation2 game *ATV Offroad* is out of the same mould, combining simple controls and a very shallow learning curve to produce a refreshing and reasonably challenging quad-bike experience. *ATV* won't appeal to the purists who need to tweak every valve and apply the laws of motion to every twist in the track, but there's more than enough here for those who want to mix a little customisation with some great fun.

After a simple tutorial, *ATV* offers four modes of play and an impressive range of locations. The MAXXIS Nationals lies at its heart, with players battling bush tracks, snow-covered mountains and desert sands to compete for the tournament title. Stadium Supercross brings the action indoors, mixing tight curves, plenty of straights to pick up speed, and some very impressive jumps to keep things interesting. The challenging Enduro is probably the pick of the bunch for a quick adrenaline rush and a true off-road experience, as players choose their own route through a series of checkpoints. Freestyle mode focuses on stunts for those who are more interested in points than placings.

Rainbow has placed the emphasis on action rather than customisation, but players still get to make some decisions. Twenty-odd Quads are available to choose from, all of which are rated by maximum speed, acceleration, traction and stability. Minor adjustments can be made in the workshop, although the effects aren't really that obvious on the track, and it's just as easy to choose a preconfigured option. Acceleration is probably the key difference players will notice between the various bikes, particularly in Supercross and Freestyle play, and tweaking won't be a big issue after the first few runs. A reasonable mix of skins is offered, although costumes can't be selected separately to the bikes, and few of the schemes really stand out.

Putting the odd law of physics to one side, *ATV* drives very well. Acceleration and brakes are all that matter for most tracks, and Rainbow has incorporated an innovative suspension pre-loading feature into the left analog stick. It takes a little while to master, as the stick also controls direction, but engaging it at the bottom of a jump translates into a lot of air at the top. Absolutely critical in Freestyle play, pre-loading well can also mean the difference between victory and defeat in the race events, as players try to balance the competing benefits of flying and traction. The controls are tight and responsive, and the wide tracks offer plenty of opportunities to steal the march on other riders.

ATV's terrain is a little bland at a distance, but the feeling of space is definitely there, and it all looks



great close up. Little details like dust, water and lighting are very well modelled, and collisions are realistic and impressive to watch. It also sounds very good, despite some interesting retro music, and generally avoids the annoying repetition that tends to plague racing titles. The AI offers a decent challenge despite the relatively simple game mechanics, although players may get frustrated at times with what seem to be team tactics by the AI riders. Fortunately, certain defeat in the early days can be avoided by opting for split-screen challenges, in which the frame rate is still very respectable.

ATV Offroad is an above-average title that's good for the long haul or a quick break from GT3. Its overall simplicity is more than matched by a terrific pace, smart AI and a great atmosphere. It's more arcade than simulation, but Rainbow Studios has included enough real-world physics and customisation options to retain the interest of the more analytically retentive. Those who just want to ride fast and high will have nothing to complain about. ○

ⓘ There is airborne, and then there's AIRBORNE!

GAME DETAILS

○ **FOR:** Simple to learn, plenty of action and a solid range of tracks.

⊗ **AGAINST:** Graphics are a little bland, cheating AI.

MINIMUM REQUIREMENTS: PlayStation2, memory card
RECOMMENDED: Dual Shock Controller

DEVELOPER: Sony www.sony.com.au

PUBLISHER: Sony www.sony.com.au

DISTRIBUTOR: Rainbow Studios

www.rainbowstudios.com

atomic

8.5/10

MechCommander 2

Des McNicholas presents the first mech game review without any mech puns in the intro.



i The game interface is first rate, with all the necessary data, including objectives, available onscreen.

Microsoft's MechWarrior series has been a success by any standards, so the lukewarm response received by the first MechCommander probably came as a bit of a surprise. MechCommander 2 manages to jump up a level to squad tactics while retaining the basic feel of the series, and introduces some innovative approaches to the RTS genre along the way.

MechCommander 2 puts players in the role of a mercenary officer, commanding a squad of BattleMechs in action on the planet Carver V. Campaign based, the game ships with an excellent tutorial, the full range of multiplay options and an unsupported mission editor. The campaign is well scripted and presented, with genuinely challenging missions in a highly charged political environment.

Starting with a small number of pilots and units, players seek to earn resource points with which to upgrade their forces for increasingly demanding assignments. The Mech Bay screen is sharp and straightforward, and teams are easily knocked together to suit specific mission objectives. A good range of weapons and armour is available, with pilots also gaining useful experience as the game progresses. Salvaged enemy Mechs can be added to the pool, and players have the chance to assign skills and awards at the end of each mission. The aim is to produce a well-balanced group to draw from, and veterans of the MechWarrior upgrade system will probably find mission planning as much fun as the battle itself.

With only a small number of units onscreen at any one time, MechCommander 2 lets players apply some sensible tactics while using the skills and equipment of individual Mechs to best effect. Despite a couple of minor irritations, the interface suits intimate control, and the ability to issue orders while paused further encourages something other than a mad rush.

Although the AI is a little average on both sides, a limited range of default orders is available, and friendly Mechs can generally be relied upon to do the right thing. The incessant chatter between the troops is a good way to stay on top of things, and Mechs can be grouped to keep an eye on each other.

The onscreen Combat Interface is particularly solid, incorporating navigational and sensor information, unit status bars, and key data on all members of the deployment team. The Mechs are by no means on their own, with a simple Support Palette providing ready access to air strikes, artillery, sensors and support vehicles. The associated Command Palette is used for basic fire and movement orders, as well as assigning special tasks such as guarding locations, laying mines and directing suppression fires. Descriptive tactical symbols provide a high degree of situational awareness, and line of sight is clearly indicated by the mouse cursor.

Microsoft has made the most of the new 3D environment, modelling all features, buildings and units to a high standard. Weapons are handled exceptionally well, with long-range fires being a joy to behold, and specialist systems clearly identifiable on individual Mechs. The excellent in-game effects are matched by high-quality cut scenes and well-designed planning screens, supported by decent sound effects and music. The whole thing is showcased by a good range of camera features.

MechCommander 2 is a solid title that will please those who struggled with the original game as well as newcomers to the BattleTech world.

It's an impressive RTS in its own right, but the link with the long-running MechWarrior series makes it something a little special. □

GAME DETAILS

FOR: Excellent tutorial, solid campaign and terrific online play.

AGAINST: Minor interface problems, average AI, no skirmish mode to try out new Mech configurations.

MINIMUM REQUIREMENTS: Pentium 266MHz, 64MB RAM, 400MB hard disk space, 8MB DirectX-compatible video card

RECOMMENDED: Pentium III 450MHz, 128MB RAM, 32MB video card

SOUND APIs: Direct Sound

VIDEO APIs: Direct 3D

DEVELOPER: Microsoft www.microsoft.com/games

PUBLISHER: Microsoft www.microsoft.com/games

DISTRIBUTOR: Microsoft www.microsoft.com/games

ALWAYS BET ON DUKE



TAKE 2
INTERACTIVE



PREVIEW: Civilization 3

George Soropos invades the inner sanctum of Infogrames and commandeers the Civilization 3 Beta in the name of Atomic.



There is an HMV music shop in Pitt Street Mall here in Sydney and my most enduring memory of the Civilization series is of watching a young shop assistant's career slowly slide into a self-destructive addiction where playing the game became more important than serving the customers. The time it would take to shake this character away from the shop computer got longer and longer, until he eventually lost his job. The cult of Civilization had been born.

It has been ten years since the first release of Civilization back in 1991. Ten years! PCs and PC gaming have come a long way since then, but the basics of Civilization are still the same: take over a burgeoning society from its earliest days and guide it through the pitfalls of progress and politics until your culture reigns supreme.

On the surface Civilization III looks only a little different from the earlier versions, but after more than three years work Firaxis has changed many aspects of the design, balance and feel of the game, mostly in response to gamers' suggestions based on their experience with Civilization II.

The graphical enhancements include a new world generator that creates more realistic-looking continents, but mostly concern the representation of the units. Rather than painted lead figurines of the sort you might find at a tabletop games convention, all the units in Civ III are now given life with over 15,000 frames of animation, including more detailed battle sequences.

The city view makes a welcome return to the game for those players who like to keep an eye on their progress. The new city view also changes according to the culture of which it is a part. A European city will have European architecture and a Middle Eastern city will have buildings to match its background.

However, the real heart of the changes to the game design lies in the concepts of trade, resources, nationality and culture. Trade is no longer just a way to top up your coffers or give your cities something to do when they've run out of buildings to construct. This is because of the new way in which military units are supported. Cities are no longer responsible for the units they create; your entire nation is called upon to share the

① It's just like Civ II but prettier and much, much deeper.

burden. Part of that burden is ensuring that your empire has the right materials to build and maintain its various units.

For example, if your civilisation has no access to bronze, then it cannot build Phalanxes, and trading for that bronze becomes very important early on in the game – it's not just an afterthought. While we're on the subject of resources, it's interesting to note that special resource tiles in Civ III don't become apparent until your civilisation has the science to use them. In other words, it's not possible to deliberately plant your first city in a rich area as you won't see any special tiles until much later.

This new emphasis on resource types for production also has a side effect that drastically changes the military landscape of Civilization. Now it's important to defend your territory as well as your cities in order to safeguard your trade roads and resources. Trade is necessary for building up your military and trade; therefore, it becomes a primary target in warfare – an interesting and intriguing twist.

The way individual cities manage resources has changed considerably as well. Settler units now only found cities, a new worker unit is used to make roads and improvements and these guys can be automated in the same way the settlers used to be. More significantly, cities influence over the terrain around them no longer grows as a function of the cities size, but of their culture. In other words; you can no longer just leave cities to themselves and expect them to grow. You have to nurture the culture



of each city in order to expand its influence and then increase its population. Today, nations and their influence on everyone around them are defined by their culture, and this aspect of the game helps to make it that much more like real history in the sense that it encourages players to really think about their civilisation's culture for the first time.

Players can build the usual cultural building types such as coliseums, wonders, courthouses and cathedrals. What is really interesting, however, is that the longer a building has been around, the more cultural influence it has. If you have a library that's been around for a long time and has been collecting books about your people for eons, that library will have a lot of cultural influence. This makes the city that the library is located in very important not only from a cultural point of view, but because your borders – another important concept in Civ III – are determined by your cities' influence.

It also has the effect of encouraging even the most war-hungry players to develop the culture of their chosen civilisation.

The border system is similar to that in Alpha Centauri, but is even more closely linked to diplomacy, culture and trade. Enemy civilisations can no longer build cities within your borders without starting a war and 'free passage' agreements can be made to allow travel within your territories.

But wait, there's more! (Don't ever say that again. Ed.) There are 16 civilisations in Civ III and they have a new system of categorisation. There are six categories: Militaristic, Commercial, Expansionistic, Scientific, Religious and Industrious, and each

❶ The diplomacy in Civ III has been greatly enhanced over previous iterations of the game.

civilisation is given two categories. For example, the Romans are a Militaristic and Industrious civilisation and they receive bonuses for some of their military and construction-oriented activities.

Civilisations also now have one special unit that only they can build, the historical timing of which depends on the nation involved. The Americans, for example, have the F-15 fighter, which obviously doesn't become available until later in the game. If you want some strength earlier in the piece you might choose to rule the Romans as they get their special unit very early on.

Another new concept introduced in Civilization III is that of the Golden Age, which is meant to represent the period in history when your civilisation is at its zenith. The Golden Age of your civilisation makes all worked tiles in your empire cough up one extra trade and shield per turn. Golden Ages only happen once, last twenty turns, and begin when any one of your civilisation's 'special units' wins its first combat against another enemy.

The only things we can't tell you about are the multiplayer aspects of Sid's new baby. At the time of writing, all we could get out of Firaxis and Infogrames was a press release promising that multiplayer would be 'innovative and exciting' If they are true to their word, then Civilization fans should not be disappointed with this incarnation of a gaming legend. □

GAME DETAILS

DATE DUE: November 2001

DEVELOPER: Firaxis www.firaxis.com

PUBLISHER: Infogrames www.infogrames.com

DISTRIBUTOR: OziSoft www.ozisoft.com.au

No pain, no gain

Daniel Rutter returns once again to save us all from the dastardly evils of Captain BSOD. No problem is too great for this walking, talking help desk.



Hassle of the Month

This month's I/O Letter of the Month goes to Chris Caudwell, for his powerful question regarding PSUs. He'll soon be hot-swapping his hard drive with ease with the extra funky Lian Li mobile hard drive rack (pictured above), thanks to the kind folk at Anyware Computer Accessories (www.anyware.com.au).

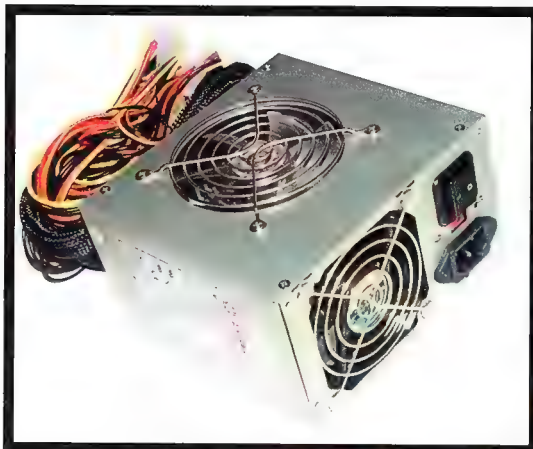
i I recently built a new machine with a 1.2GHz Athlon CPU and 'to be on the safe side' bought a case that boasted a 300W power supply. Exactly a month later it failed, and I was back to the search for good information on the subject. Basically there are two questions that we would all like to know the answer to:

- a) how do I calculate how much power I really need for a given system; and
- b) how do I know if the power supplies on sale are any better or worse than each other?

Chris Caudwell

① A 550W (!)
Enermax
EG651P-VE PSU
– the choice of
loonies.

Send your
questions to io@atomicmpc.com.au or by
post to:
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O Power supplies do not have just one output. Sure, if you take the amp ratings for the +3.3, +5 and +12V 'rails', multiply them by the voltages and add them all up, then you'll get a number which may resemble the power rating on the sticker. But your computer is unlikely to load each of the PSU's rails evenly.

If you've got a 300W PSU with 3.3, 5 and 12V rail ratings of 20, 30 and 12 amps respectively, then just multiplying and adding gives you 360W. But that's split up among the rails into 66, 150 and 144W, respectively, and one rail can't 'lend' power to another.

Moreover, if you max out one rail – if you've got a bunch of devices sucking on the 5V rail, or a fan farm drawing power from 12V – then the voltages on the other rails are likely to sag in sympathy, and flake out your computer.

And, of course, dodgy power supply units such as those that come with many cheap cases may have a short lifespan, no matter how lightly you load them.

The overall wattage rating on the sticker doesn't give you much idea of the capabilities of the PSU, by itself. There are lots of cheap yum cha PSUs with optimistic ratings.

Even the individual rail current ratings can be misleading; they may, for instance, be rated according to the maximum power they can deliver at the rated voltage when the other rails aren't loaded at all. Generally, this never occurs in a working PC unless you've done some totally bizarre backyard modifications that change how your components source their power.

A decent rule of thumb is that if you work out the wattages for all of the rails, add them together and end up with a result substantially higher than the overall power rating, then you're probably looking at a decent PSU. If the rail powers added together don't equal the overall power rating, then you're looking at a lousy one.

Anonymous ASUS

I've got an ASUS A7V-VM mainboard. Can you tell me what graphics chip it is using. Does this board support the AMD Athlon 1.33GHz C-type CPUs and let it run at full speed?

Richard Liu

It's hard to pin down information about this board, but I presume you've got a HP Pavilion PC. I presume this, because I'm fairly sure that Pavilions are the only machines that ever contained the VM variant of the popular ASUS A7V. ASUS has made special boards for a variety of HP machines.

If you've got a VM with built-in video – not a separate video card – then it ought to be using the VIA KM133 chipset, which is based on the KT133 – not the newer KT133A. That difference matters.

The video adaptor on KM133 boards is an S3 ProSavage, which is very slow for 3D by current standards. Not useless, but not even slightly exciting. Even a modest graphics card like the TNT2 Model 64 [M64] will spank a ProSavage.

Despite the '133' in its name, the KM133 chipset can only do 100MHz frontside bus (FSB). The updated KT133A can do 133MHz, but the KT133 and its relatives can't.

Thanks to the Athlon's bus design, 100MHz FSB means a 200MHz processor-to-chipset bus speed. 'C' Athlons that want a 133MHz bus speed will work on a 100MHz-only board, but they'll run at three-quarter speed, so a 1.33GHz Athlon will give you only 1GHz.

Faster, Fifi! Faster!

I have a 566MHz Celeron running on a SystemBoard M754LMR Socket 370 motherboard. When I try overclocking by changing the CPU multiplier settings, either directly from the motherboard or in the BIOS, it makes no change at all to the speed of my CPU. How can I overclock the CPU on my motherboard?

Danny Weaver-Koenigs

All Intel CPUs have a locked multiplier. It doesn't matter what multiplier you ask for; you get the one the CPU uses as standard.

To overclock, you have to increase the FSB speed, and possibly also the CPU core voltage. Your PC Chips motherboard only supports 66, 100, 105 and 133MHz FSBs, and has no voltage adjustment feature, so you're out of luck.

'SystemBoard', by the way, is just a brand name PC Chips uses for its motherboards. And PC Chips is not exactly what you'd call a stalwart of the overclocking scene.

Your Celeron runs at 66MHz FSB normally. If you set your motherboard to 100MHz FSB, that corresponds to an 850MHz core speed. A Celeron 566MHz may be able to handle this, because it's the second slowest Celeron to use the Pentium III-based 'Coppermine 128' core, not the old Pentium II-based one. Those older Celerons topped out at around the 500MHz mark.

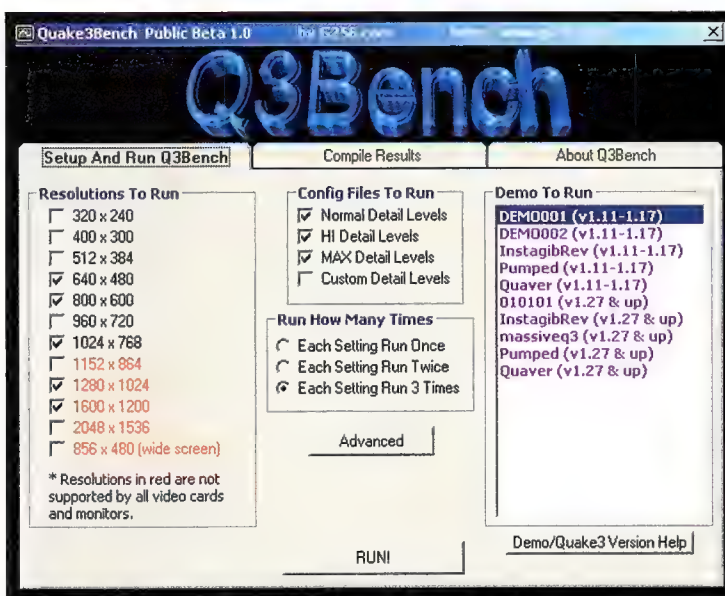
A speed of 850MHz is not unheard of for 566MHz Celeron CPUs, 800MHz is common, and

some even manage 900MHz. You need to boost the core voltage, though, and the M754LMR doesn't let you do that.

Quake quickie

Hi! You'll probably laugh at me for not knowing this, but how do I use the Quake 3: Arena timedemo for benchmarking? Is the Quake 3 benchmarking program that you use available to the public? If so, where do I get it from and how do I use it?

Ben



Q3Bench has been saving our sanity when benchmarking, since early 2001.

You can do timedemos from the Quake 3 console easily enough, but there's a utility called Q3Bench that makes repeated test runs far simpler. You can get it, and its accompanying documentation, from www.g256.com/guides/Q3Bench.

Upgrade questions

Hi! I want to buy a new computer and would be grateful if you could answer a few questions:

1. Would 128MB of DDR RAM or 256MB of SDR memory be better? If 128MB is adequate for a gamer who won't be able to upgrade for a long time (a few years), should I go for DDR?
2. Should I get a 1.33GHz Athlon or a 1.5GHz Pentium 4 (I missed the Athlon versus Pentium 4 article in your first issue)?
3. How could I improve my really old 133MHz Pentium with 16MB of RAM fairly cheaply, to use as a spare computer/word processor?

Shadow Spear

1. Double Data Rate (DDR) RAM does give Socket A (Athlon and Duron) systems better performance than the same amount of Standard Data Rate (SDR) RAM, but not by a big enough margin to justify a premium price. Australian pricing for quality DDR RAM is still much higher than the cost of SDR, so I'm unconvinced of its value.

Then again, all SDRAM, SDR or DDR is pleasingly cheap now, so it's not that big a deal. While 128MB is enough for a Windows 95-series OS game machine, including Windows Me boxes, it doesn't hurt to have a little bit more.

2. As I write this, the low prices in the US are about \$US130 for the 1.33GHz Athlon, and about \$US240 for the 1.5GHz Pentium 4 (which is slower than the Athlon for desktop computer tasks). You're

also looking at \$AUD300 or so for a decent Athlon motherboard, and \$400 or so for the Pentium 4 board – on which you're going to have to put Rambus memory, because no Pentium 4 boards supporting other kinds of memory exist yet.

Full-spec PC800 Rambus RDRAM continues to cost considerably more than even DDR SDRAM, and Pentium 4 boards require you to install the modules in matched pairs, which makes them even lousier value. PC600 RDRAM is considerably cheaper, but significantly hurts the Pentium 4's performance.

3. Upgrading old Socket 7 machines like your Pentium isn't a very sensible thing to do economically. SIMM RAM modules to suit them are much more expensive per megabyte than current model DIMMs, and you can't use the faster Socket 7 CPUs, because the old motherboards don't support sufficiently high FSB speeds. The motherboard may work with, say, a 500MHz K6-2, but it would only run it at 333MHz. This would still be a large improvement, mind you.

The laptop of mystery

I bought a second-hand laptop that kept crashing, so I formatted the drive and installed Windows Me. Unfortunately, I realised too late that I did not have the recovery disk for the video drivers. Could you please tell me how to find out what drivers are needed, as the people that originally sold the laptop are not helping at all.

The laptop model is a Highlander HL63A, the processor is a Pentium III 600MHz and there's 256MB of RAM. Please help, as this laptop is for school and I really need to get it working.

ds98 Stocker

 Well, Mr Stocker, I don't know what hardware your laptop's using.

What I do know, or am at least sure enough of that I'll let it be printed in a magazine, is that Highlander laptops are actually a Clevo product. The Clevo site is www.clevo.com.tw.

Clevo do a roaring trade in cheap laptops. They're so cheap, because they use some desktop PC components, like CPUs, instead of the special lower power consumption laptop ones. So some corners are cut, but you get a good general feature set for the price.

If you go to the Clevo site and look up whichever Clevo product matches the specifications of your laptop, you'll be able to download the driver package for that machine and all should be OK.

Optimal, schmoptimal

I have been told that each processor has an 'optimal' amount of RAM. Can you please elaborate on this topic and tell me what my optimal amount of RAM is (I have an 800MHz AMD Duron with 128MB).

Thomas Baxter

 You know, I've been told that squirting coffee up your bottom can cure cancer.

This belief, and the belief that the amount of memory your computer should have has something to do with the CPU it uses, are both based on no sound evidence.

Your computer needs enough memory for all of the stuff you want to do at once. Modern operating systems, including all of the Windows flavours, use hard disk space as 'virtual memory' when they run out of real, or 'physical' RAM. The hard drive is much slower than real RAM, so if you want decent performance from a PC, you need as much physical RAM as is necessary for the tasks you want to perform.

Generally speaking, that means 128MB for the average Windows 95, 98 or Me user who plays games. Another 64 or 128MB will help a bit more, but it's nothing to get excited about. Given how very cheap RAM is these days, though, why not?

If you're using an NT-series OS, including Windows 2000 and XP, then you want 256MB, or at least 192MB. If you're doing memory-intensive tasks – heavy multitasking, graphic design, database serving, CAD,

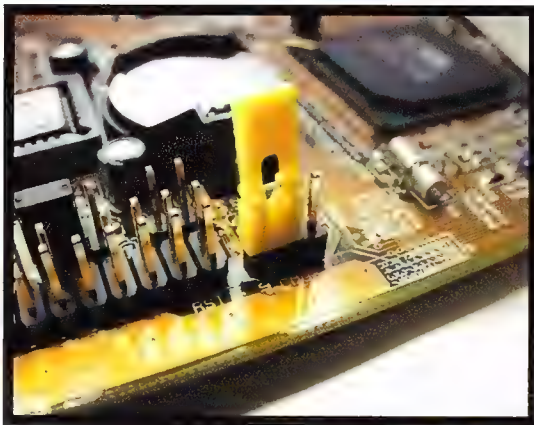
scientific computation – then you may need a lot more.

But the speed of your CPU has nothing to do with it, except to say that an old, slow processor isn't going to give you half-decent performance for various tasks, including current games, no matter how much RAM you've got.

BIOS blasting

When resetting the CMOS/BIOS password by changing the BIOS password jumpers to the clear position, is it necessary to place the jumper in the clear position, boot up the computer, shut it down, replace the jumper to the original position and boot up again? Or is it possible to set the jumper to the clear position, then back to the normal position without starting, and boot up?

Joel Little



 The clear CMOS jumper is one of the greatest inventions ever.

 The Clear CMOS jumper that's present on many motherboards removes backup power from the memory chip that holds your computer's BIOS settings. The backup power is provided by the battery on the motherboard – usually a 'coin' cell, these days – at those times when the computer isn't getting mains power.

Modern ATX machines generally use the 5V standby line from the power supply to maintain the CMOS memory when the computer is plugged into the wall, but not turned on. For the Clear CMOS jumper to work, you therefore have to disconnect the power lead first.

The jumper isn't just for clearing a BIOS password, if you've set one; it clears all of the CMOS settings back to the defaults. And no, you don't need to turn the computer on for the clearing to work. Just unplug it, set the jumper to the clear position for several seconds, set it back to the original position, and power up again. That's all there is to it.

Some motherboards have solder pads rather than a proper jumper. To clear the CMOS on one of these motherboards, you have to short the pads for a few seconds with a screwdriver, coin, broadsword or platinum ingot. Cadillacs work, too, but you'll need a long pointy one that'll fit inside your computer case. ☐

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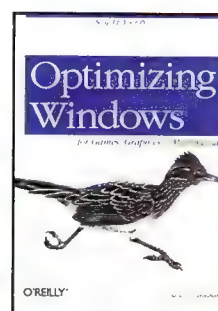
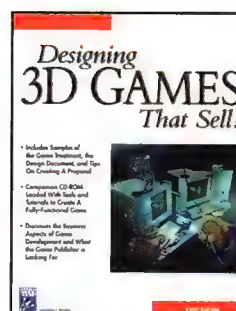
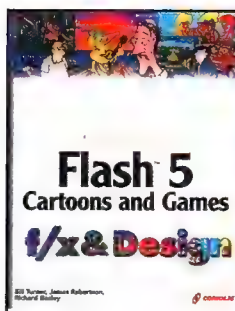
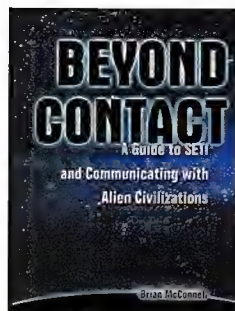
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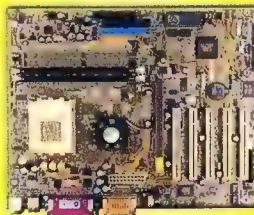
MAXIMUM POWER COMPUTING

It's never been so easy to find that elusive GeForce3 card or track down someone to fix your 21in monitor that just came out of warranty (goddamn it!). We know that there are countless places where you can buy your computer gear. This is not one of them. The IT Directory isn't a place to buy – it's a way to buy. A smart way.

It goes a little something like this . . .

You like products such as GeForce3 cards because they rock. You read about them in atomic and become so excited you are compelled to throw caution to the wind and go and buy them. Which is good. But off you trot to your local reseller and they don't have the product. Which is bad.

So, once again, atomic comes to the rescue – or the atomic IT Directory, to be more precise.



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Use it. It works.

And, hey! If you're a reseller of computer hardware and software or an IT service provider, you better get yourself into gear! If you're not registered on the IT Directory our readers won't know you exist! So contact Joveline or James on (02) 8399 3611, or email them at sales@atomicmpc.com.au, and they will show you how to participate.

www.atomicmpc.com.au

Fan maintenance: Fixing the spinny bits

Daniel Rutter spins a tale of a die-hard fan.

Your computer's life probably depends on fans. At least two, in most current PCs: a little fast one on the CPU cooler, and a bigger, slower one in the power supply unit (PSU). Many PCs have a second 80mm fan mounted in the front of the case to help with airflow. And some special PCs have a veritable wind farm in there, competing for space with the neon lights and fluffy dice.

The trouble is, fans don't last forever. The motors in modern computer fans are brushless units which will last, by computer standards, forever. But the spindle on which the fan turns sits in a bearing, and these bearings eventually wear out.

'So how do you oil a fan bearing? In almost all cases, it's actually quite easy.'

The most common, and cheapest, kind of fan bearing is the 'sleeve' type. It's a simple design; the steel shaft just sits in a solid bushing. The bushing is likely to be made from sintered bronze, which is porous metal impregnated with lubricant at the factory. When that lubricant runs out, the bearing will start to wear and buzz. The wear will get worse and worse, the buzz louder and louder, and the fan slower and slower – until finally it stops.

This process can take weeks for larger, slower fans, but it can happen a lot faster to smaller, higher speed fans. A failed CPU cooler fan probably won't leave you with a dead CPU, but it will make your computer hopelessly flaky until it's replaced.

The other kind of bearing is the 'ballrace', commonly known as a 'ball bearing'. On the inside, a ballrace looks like a ring of steel balls set in the space between the stationary outer ring and the rotating inner surface. Ballraces last better than sleeve bearings, but when they finally do fail they can seize rock solid. That said, they can still benefit from occasional lubrication.

If you catch a deteriorating bearing before it gets too bad, you can make the fan live a lot longer with a few drops of oil. If you oil a bearing before it shows any symptoms, the thing can live for a lot longer than the manufacturers expect it to.

So how do you oil a fan bearing? In almost all cases, it's actually quite easy.

Exposing the ball

The PSU fan: First, you need to get access to the motor side of the fan (the side with the sticker).

Stick 'em up: Most ATX PSUs, including the one

pictured, have their fan mounted so that you can see the sticker through the finger guard. Undo the four screws holding the finger guard in place (they also hold the fan in place, but it probably won't have much room to move even without them). That way you can get at the sticker side of the fan without taking the lid off the PSU.

Now, carefully peel back the sticker. If you damage it, don't panic; you can just replace it with any piece of tape.

Naked balls: Small fans often seal the bearing using nothing but the sticker, but larger ones usually have a round plastic cap under the sticker. The fan you see

at right has a rubber cap, which is easy enough to pop out with a small screwdriver.

More lube: Inside, you can see the bearing. This fan's got a ball bearing; sleeve bearings are less interesting looking.

Now, oil that sucker

What you oil the ballrace with isn't too critical – any light oil will do. For example, plain old 3-IN-ONE or sewing machine oil from the supermarket is fine. Spray-can oils with an applicator tube can be handy for oiling fans in awkward spots, if you can avoid spraying oil all over the place.

Do not, however, use WD-40 or similar products. WD-40 has great penetration, displaces water well and loosens rust – but it's a lousy lubricant. It consists mainly of kerosene, and the oil that's left when the kerosene evaporates may be more than adequate for stopping a gate hinge from squeaking, but won't last long in a fan bearing.

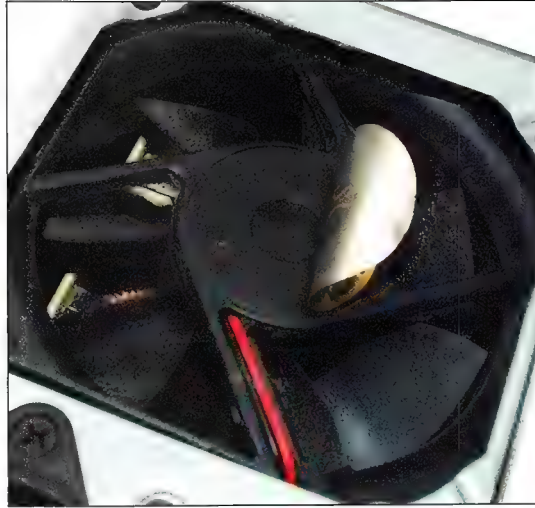
Resist the urge to completely fill the bearing well with oil. If the fan isn't installed bearing side up, excess oil in the well will leak out rapidly, regardless of what you stick over the well. Even if the bearing side is upwards, the centrifugal force present when the fan is running will allow a surprising amount of the oil to escape to places better left lube-free.

If you want to fill the well with oil and let the fan sit for a while – so the oil can permeate the bearing a bit – that's fine. But soak up the excess with something before you put the sticker back on, or you'll just make a mess. You'll probably also need to de-grease the plastic back of the fan to get the sticker to adhere again.

○



❗ The PSU fan: The PSU fan resides underneath the fan grill at the rear of the unit.



❗ Stick 'em up: Once the grill has been removed, it's time to peel back the protective sticker.



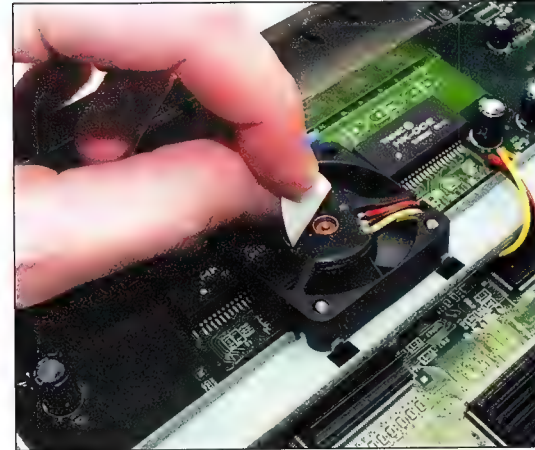
❗ Naked balls: Revealed in all its glory, the fan bearing hungers for a fresh lube job.



❗ More lube: Grease that baby up, making sure you don't add excessive amounts of lubricant.



❗ Even large fans, like this 120mm mains-powered unit, have the same bearing arrangement as much smaller models, so you can use the same technique described here.



❗ Some fans can be oiled without removing them from the equipment they cool. This small 5V fan, in a network switch, is an unusual item that would be difficult to replace.



333

555mhz

THE FRIDGE PC

Computer geeks at the Massachusetts Institute of Technology (MIT) often have their PCs sitting on their apartment balconies in the middle of winter, covered in snow. Long cables run from the PCs into slightly open windows, where the user sits in warmth and comfort while their PC is kept cooled well below zero, enabling it to run at a lightning pace. While Australian winters don't really allow us to do this, the students at MIT inspired us to make our own inexpensive cooled computer environment. Matt Overington got to work to create the fridge PC.

The first question most people asked while we sourced the parts required for this project was, 'Why?'

It's quite easy for people to understand that computers tend to get warm when you run them for a while. It's also not too hard to explain that a CPU will experience problems if it overheats, and that the resulting best-case scenario is that your computer crashes – at worst it may do permanent damage to your chip.

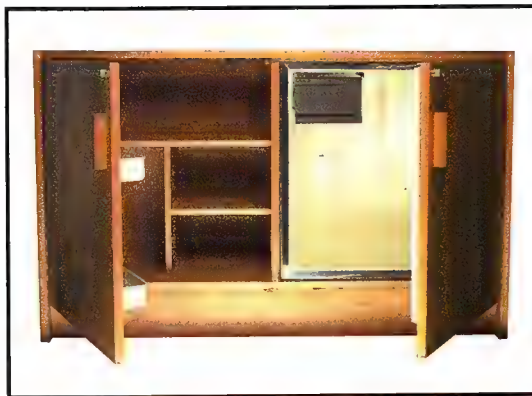
Modern computers demand sophisticated cooling systems so they can continue to function at optimum level, and although it's straightforward enough to get them to run faster than they were initially designed for, heat is always the limiting factor. The most efficient way to keep a computer cool is to place it in a refrigerated environment.

Enter the fridge PC. Using equipment scrounged from the *Trading Post*, we managed to construct a PC case that doubled as a piece of furniture while keeping our computer at a comfortable 2°C. Did we mention that this was not a particularly good idea,

unless you are extremely careful to avoid the damage that condensation can cause to your computer? To combat this, we've come up with a few tricks that will ensure you can run a computer condensation-free inside a fridge to get it to run about 10 to 20% faster – all for less than \$200.

We managed to pick up a second-hand bar fridge that was in good condition and set inside a cabinet for only \$120. We're sure that the fridge dates back to the late '70s, but it was still in excellent working order and, most importantly, the seals weren't damaged.

Tight seals are crucial, as any air that gets into your fridge will carry water. So it's absolutely vital to keep your fridge airtight to minimise the damage that can be done by condensation. We were fortunate to find a bar fridge that was set inside a cupboard. We were also suitably impressed with the extra storage space available in the cupboard, and the top of the unit was excellent for holding printers, spare joysticks and scanners, freeing up desk space.

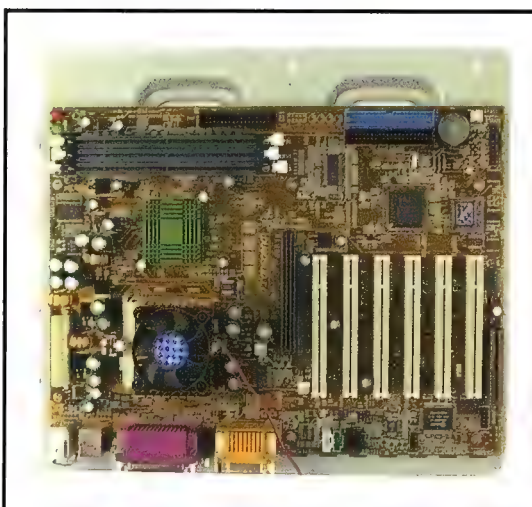


ⓘ Looks like a boring cabinet, but it hides a ready-made PC cooling device (also known as a bar fridge).

i The power supply unit is mounted onto the side wall of the fridge, with the motherboard on the base.



i Mount the motherboard using a mounting plate from an old case.



You should be able to pick up a cheap preloved 80L bar fridge; and after you have one, mounting the computer into it is relatively straightforward. It is a lot easier if you have your old PC case to butcher for parts, but it's not absolutely vital, provided you have access to a well-stocked computer shop nearby.

Packing in the power

After you thoroughly clean the inside of your fridge thoroughly and allow it to dry, the first thing to mount to the inside wall is a power supply. We opted to use a 230w unit as it will generate far less heat than a 300w one, and because the heat is going to be recycled straight into the fridge, keeping it to a minimum is in our best interests. Most power supplies come with a variety of holes and clips, so the way you mount yours may differ slightly to the way we've mounted ours, but the methodology is the same. Measure the distance between holes on the power supply (it turned out that ours had two clips mounted to the underside of the supply, so we opted to use them), and mark holes in the side wall of your fridge. At this point it is vital to ensure that the

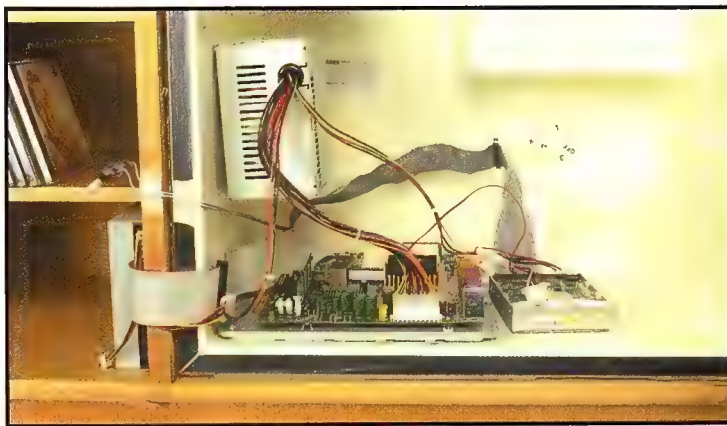
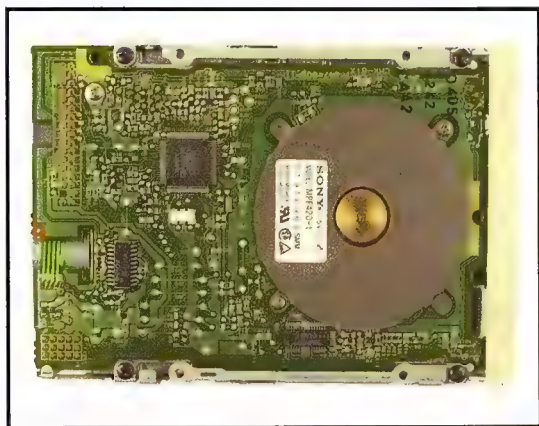
Cooled PC cases

It is now possible to purchase cooled PC cases designed to keep your components at a stable -20°C. At the moment they are rare and extremely expensive, although they are slowly becoming popular overseas. These cases address the problem of humidity, using a dehumidifier to act upon the cooled air. The biggest advantage to using a case that has a built-in dehumidifier is that it doesn't require the excessive amounts of silica gel that we had to use to keep condensation down; in fact, this is all taken care of automatically by the case itself. Being able to run an extremely low, yet stable temperature in condensation-free conditions is highly beneficial for the hard-core overclocker, but at the moment these cases will set you back in excess of \$1,000 alone. Keep your eye out for upcoming reviews in future issues of Atomic.

cables from the power supply reach all the computer components that they need to: your CD-ROM drive, hard disks and, of course, motherboard. Each hole that you drill through the plastic side wall of the computer will lessen the fridge's insulation slightly, so make sure you use all the holes that you drill. After you have measured and marked the holes for the mounts, use a small drill bit (3mm is fine) to drill a pair of holes through the inside plastic wall of the fridge – don't make the holes too deep as you don't want to puncture the external casing. After you've drilled the holes, line up the power supply and use two small screws to hold it in place. The plastic side wall of the fridge will be strong enough to support the power unit using only two screws, and this minimises damage to the inside of the fridge.

Cool boarding

After you have successfully mounted your power supply, the next step is to connect up the spinal cord of your system, your motherboard. By far the easiest way to connect up your motherboard to the power supply is to remove the mounting plate from your existing PC and attach that directly to the inside of



'The plastic side wall of the fridge will be strong enough to support the power unit, using only two screws.'

the fridge. This will ensure that the motherboard is well supported, elevated off the side wall of the fridge, and easy to install or remove. If you don't have access to a motherboard mounting plate, then you can directly mount the motherboard to the case, provided you have the mounting risers that are supplied with a new case and are extremely careful about measuring out the drill holes, as they must line up with the holes on the motherboard. Before you do any measuring and drilling, you must first line up the motherboard to where you want it to sit inside the case. Keep in mind that you will need to access the plugs at the back of the motherboard, and your IDE cables will have to reach components such as CD-ROM drives and hard disks. As your CD-ROM drive will probably sit outside the case (unless you opt to mount a front panel into the case of the fridge), it is wise to align the motherboard so that the IDE connectors are near the door (or at least close enough so your IDE cable will reach outside). Your hard disks will sit inside the fridge PC, so it's less vital to keep their mounting positions in mind when you are placing the motherboard – if your fridge has an internal shelf, you can always simply sit the motherboards on top of the shelf. After you've managed to locate the optimum position for the motherboard, drill mounting holes through the side wall (or the bottom) of the fridge, and carefully mount the motherboard to the side of the fridge using two screws, like the power supply. Two screws provide plenty of support for the motherboard, as there is relatively little force exerted upon it when it is running. Keep in mind that it is much easier to attach things like your RAM and CPU before you install the motherboard into its new environment – and it's best to attach your IDE cables to the motherboard beforehand.

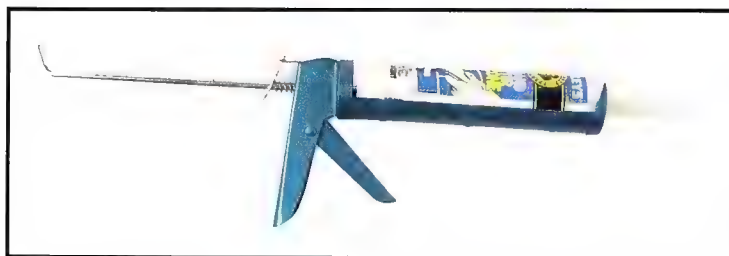
Feeling a little CD?

After you have selected the locations for the motherboard and power supply, and have them successfully installed, it's time to attach peripherals so you can actually use the machine. The first thing to attach after the RAM and CPU and IDE cables is your CD-ROM drive. In our fridge design, we used a CD-RW drive, and we opted to install it outside the case. This makes changing CDs much easier, and because the CD-RW drive is often opened and closed, we were worried that extra air would get into our fridge and cause condensation. Perhaps you're thinking we're slightly paranoid about the issue of condensation, but have you ever looked inside your freezer at the end of summer and noticed all the frost? That frost resulted from moisture in the air. To install the CD-RW drive, all you have to do is cut two nicks in the fridge's door seal, and run the IDE and power cables out to the CD-RW drive (you could also run an audio cable out through another groove in the door seal, but we didn't worry about it as we don't use the CD-RW for audio very often). At the moment, don't worry about the nicks in the door seal, as we will take care of those later with some silicone sealant.

Mounting hard disks

After you have successfully attached a CD-ROM (or CD-RW) drive to your motherboard, it is time to think about attaching your hard disks. There are several options to installing the drives, and it is entirely up to you which one you use. Possibly the easiest way to install a hard disk is to not attach it to any surface inside the fridge, and instead leave it sitting on the bottom shelf. As you are rarely (if ever) going to be moving the fridge around, it is not going to suffer too much if you don't bolt it to anything, and this will reduce the amount of holes that have to be drilled ➤

① The hard drives are mounted inside the fridge, and any drives that you need to access regularly should sit outside.



i Some silicon sealant in a calking gun will be a good option for sealing the fridge door.

inside the fridge's wall. If you do feel you would like everything inside the case to be bolted down, then you can choose from a couple of attachment methods. Because you don't have access to the wall of the fridge from the outside, you can't mount a hard disk in the usual way – via a screw through the bottom of the drive. This means you will have to use mounting brackets to hold the drive in place. If you are using an old case to source the parts for your

this, you have to make sure the fridge is sealed airtight. The best way to ensure that no air gets in or out is to use a silicone sealant around the door seal after the fridge is closed. The silicone will block all outside air from getting in, and although you will have to use more silicone sealant each time you open the fridge door, this is not really an issue, as you should rarely have to open it. After closing the fridge door, use an applicator gun to squeeze the silicone sealant out onto the edge of the seal. You will want to put about 5mm of the sealant all the way around the door, onto where the seal meets the fridge itself. Make sure you put a little more around the cables, or any other place where air could escape. Silicone sealant (and an applicator gun) is available from any good hardware store, such as Hardware House or Bunnings, and will set you back around \$10 for both the gun and the sealant.

'The best way to ensure that no air gets in or out of the fridge is to use a silicon sealant around the door seal . . .'

fridge PC, then you will have drive mounting plates as part of the old case.

Simply dismantle the mounting plates (it may even work out that you pull out an entire metal frame capable of supporting four IDE hard disks), and attach them to the side wall of the fridge using the same method you did the motherboard and power supply – by drilling holes and using small screws to hold it in place. If you aren't scavenging parts from an old case, we suggest you install the shelf into the fridge (most bar fridges have metal shelves) and use a pair of zip-ties to connect the drive to the shelf's metal rungs. While this is not as solid as bolting the drives to a subframe mounted onto the side wall, it is still a good way to keep your hard disk secured inside the fridge.

Keeping it airtight

To use the computer, you will have to run some cables outside the fridge – at the minimum a keyboard, mouse, power supply and monitor cable. To run the cables outside your fridge, you'll need to cut grooves in the seal of the fridge. Use a sharp craft knife to trim the seal around each cable individually, making sure the door closes comfortably around the cables. It is vital that the vast majority of the door seal makes contact with the fridge body to ensure it's airtight.

You may also want to get a USB hub to sit atop the fridge, as it will provide an easy connection point outside the fridge for all your components, and you only have to run one cable back to a USB port on your motherboard. The idea is to be able to install the components to the fridge, then close it – and not open it for months at a time. To do

The evils of condensation

As we have mentioned ad nauseam, you don't want any moisture to get into the fridge itself, because the warm air generated by the computer comes into contact with cold surfaces (the motherboard, the power supply, the fridge wall itself) and any water in the air will condense onto the cold surface. If enough water condenses around your RAM slots, CPU slots, or solder-pins on the bottom of your motherboard, it can cause your motherboard to short circuit, destroying it instantly. This can also happen to your power supply, CPU, hard disks, and anything else that you have mounted to the inside of the fridge.

The best way to combat this is to use silica gel to dry the air. Silica gel is often found in food packages that are prone to mould (such as burrito wrappers), as it draws the moisture out of the air and into the gel. You can buy silica gel from places such as Hardware House, and it is relatively inexpensive. The easiest way to use it is to fill a small tin or plastic bowl with the gel and leave it sitting in the bottom of the fridge. Whenever you have to open the door to change system settings or perform modifications, you simply replace the silica gel. As fresh silica gel is installed each time the door is closed and the fridge sealed, the gel will draw the moisture from the trapped air and ensure that no damage is done to your components.

Hack and slash

You can go to extremes and use a circular saw to cut a hole in the front of the fridge door, and set your computer's connection panel into the front face of the fridge (along with any drives that you might

need connected). While this makes for a more tidy appearance, it also has some drawbacks – not all motherboards support external connection panels, and ensuring no outside air gets into the case is extremely difficult. The extra supports that you will need to construct inside the fridge itself to support the panel and drives, coupled with the extra sealant that you will need, make mounting the components to the inside of the fridge door possible, but an arduous process to undertake.

The need for speed

After you have successfully managed to install your PC installed into a bar fridge, the first thing you will probably do (after showing it off to your friends) is think about overclocking your CPU (and possibly GPU). Don't forget you will still have to run all the cooling fans that your CPU and GPU require as the cool fridge environment will not improve the heat-transfer properties of your components. All you are doing is providing cool air for the fans to draw over the heatsinks, which means that more heat can be pulled away from the CPU and GPU. As a rule, you should increase the speed of your CPU slowly, using single increments before rebooting and testing, until the system becomes unstable. When you start experiencing instability, simply wind back the speed of your CPU one notch and you have the optimum operating speed. You should be able to achieve at least a 10 to 20% overclock using the fridge to keep the air around the heatsinks cool. While this is not



much for a system that you are going to be using for word processing, it translates to quite a few extra frames when you're deathmatching someone. We managed to get an original Celeron 333MHz CPU to operate stably at 555MHz – one and two-thirds its original speed, or a massive 66% overclock. Using a refrigerator, and a good array of cooling fans, you should be able to get your computer to run a lot faster than it is now, and it could be a good way to get extra life from an old system that you have not quite got around to upgrading yet. Bearing in mind that we spent less than \$150 to get our Celeron operating 66% faster, the fridge is an inexpensive way to milk extra life from some tired components, plus it will impress the heck out of your friends.

 The completed beast is now ready to be sealed away for the next few months while you enjoy cool running temperatures.

Pesky esky? Peltiers, please!

A Peltier is another device that is becoming increasingly popular with serious overclockers as an alternate tool to directly cool a CPU. Essentially, it is made up of two ceramic plates that sandwich an array of bismuth telluride cubes, and when DC current is applied, one ceramic plate becomes warm and the other cold. Heat is transferred from one plate across the bismuth telluride cubes (otherwise known as 'couples') into the other. The 'cool' plate can pass well beyond freezing, while the 'hot' plate is capable of reaching over 200 degrees. Peltiers are available in sizes that range from postage stamps right up to Post-it notes, and are typically only 3 to 4mm thick.

DC current is used to modulate the temperature of the plates – the more current that is supplied, the greater the variation in temperatures between the plates. It is possible to control the temperature of the plates with extreme accuracy simply by modifying the current supplied to the Peltier.

By applying thermal grease to one side of the Peltier, running a modulated current through it and applying a heatsink to the 'hot' side, it should be possible to cool your CPU to well below freezing with it sitting on your desk. While this is true, the condensation that will form around your CPU will kill it (and probably your motherboard too) within minutes. Because Peltiers are so efficient, the cold plate can generate lots of condensation, and they require extremely moisture-free environments to run at optimum levels. Although using silica gel is effective, it does not remove all the moisture from the air.

Another possible negative point of Peltiers is that they require the use of extreme cooling measures. Remember, energy is still being pumped into the Peltier device that is sitting atop your CPU (which is generating heat of its own). The transferral of heat from one side of the Peltier to the other generates vast amounts of heat (on the 'hot' side), and while the 'cool' side of the device is being used to remove heat from the CPU, all of the heat generated by the CPU and by cooling the 'cool' side of the Peltier is passing through to the 'hot' side of the Peltier. So really you need a heatsink atop the Peltier that is capable of cooling both the Peltier under standard load and the heat generated by the CPU under standard load.

There are several options, as have been discussed at length in articles in previous issues of Atomic; namely, using enormous copper and aluminium heatsinks coupled with large fans, water cooling your CPU, or even using a refrigerator as a computer case. If you opt to use a Peltier with a regular heatsink, you have to run the Peltier on a low current to avoid overloading the heatsink, and it works out to be just as efficient to simply run the heatsink directly on the CPU. The most efficient options by far are either refrigerating your case or using a water cooling kit, and neither is ideal for many people – they make your computer less portable and both require diligent maintenance. While the technology is most certainly promising, it is difficult to make efficient use of it without experiencing concerns with condensation and cooling.

The ventilated spleen

Smart-talking, smart-thinking Atomicans are doing it to, and for, each other. Often with style and wit! LOTM and POTM each score an FC-900L system cooler from Anyware (www.anyware.com.au). Cool, huh?



Forum Post of the Month

'Welcome to technical support', by Rybags

www.atomicmpc.com.au/forum.asp?cat=ge&top=10444

Far too long to print here, but essential reading for anyone who has ever worked in tech support. Required reading, too, for anyone who has ever called a tech support department, or is planning to. It's funny, because it's true.

Letter of the Month: Perfectionism

I sort of remember reading in a past issue of either Atomic or PC Authority something along the lines of it 'being impossible for a reviewed product to attain the perfect score of 10'. Why is this?

I understand that all products have some flaw, significant or not, but does this suggest that it is incapable of perfection? I also read a few other computer magazines out there that also share this standpoint and have no qualms about giving full marks. One of the more memorable articles gives MDK2 a perfect 10 out of 10.

Alex

Excellent point, Alex, and generally a sticky one to answer. Luckily, we possess an Atomic confidence. Here's the go: magazines and other forms of media generally take one of two attitudes to this. One is, 'It's a perfect product, so we'll give it a perfect score'. The other is 'Yes, this product does seem to be perfect, but something better is bound to come along'.

Atomic subscribes to the former. If a product is perfect, then perfect it shall be deemed! This hasn't happened yet in Atomic – 9.5 is the highest score we've awarded. But we know that one day perfection will arrive. And that will be a perfect day.

Vinylator

I enjoyed the article on mousemats, but I have taken a different approach. Build your own desk and cover it with vinyl, so the whole desktop becomes the mousemat. It's much like the wooden desk in the article, but with much smoother and more accurate action. You then have the added advantage of being able to build shelving for stereo, CDs and junk around the computer, and include noise reduction and cooling fans with the whole lot. You have to be plenty bored to go to such great lengths. Bring on more need for speed! The only problem is delineation of where the mouse lives and where the coffee can be spilt.

Vicar

Speeding ticket

Those hackers are at it again. Many have been the times when I have heard people talking about cheating while playing Counter-Strike – he was 'wall hacking' this and using the Speed Cheat there. Now those who call themselves 'i33t H4Xx0l2s' have taken it too far. As you must have heard, a new glitch in Windows has taken the infamous Speed Cheat program to the next level, somehow tricking the computer into thinking it's running faster than it really is (by changing a date/time setting, I think).

I have seen 3DMark2001 scores at 60,000 3DMarks. Crazy, right? You can tell sure enough if someone is using Speed Cheat if they post scores like that (unless you own a GeForce10 and a 50GHz Athlon). The problem is, if people were to increase their scores by only a fraction it could cause havoc. How are you to know if someone is really telling the truth? There could be real chaos if a 3DMark2001 score was posted for a 'world record'. How would you know if it was true? It would ruin the enjoyment of boasting 'I got 3,569 3DMarks' and maybe even go so far as to take the pleasure out of tweaking, knowing that all someone has to do is download a program and is able to achieve greater scores with minimal effort. I speak on behalf of many PC owners when I ask this question: will benchmarking ever be the same again?
r!sk (aka TeChNo)

There has been an awareness of the potential for the Counter-Strike Speed Cheat to alter benchmark results for some time. It really is difficult looking somewhere like www.madonion.com and trying to work out if you are looking at the results of a skilled overclock or something dodgy; however, MadOnion is known to police fraudulent results quite well.

The key is trust. With the extreme overlocks possible using refrigerated cooling nowadays it is hard to tell from the results. This means that when looking at reviews and the like, make sure they come from a reliable source. You can rest assured that at Atomic we restrict our speed cheating to the Counter-Strike servers and keep it out of our benchmarking.

Doin' the cable wrap

I saw your article in Atomic 8 on case modding, in particular the rounded IDE/floppy cables. Your DIY rounded cables were good, but there is yet another way that I think is a bit better.

IDE/floppy cables are made up of wires joined together in plastic insulation that is joined together to make the ribbon. What I have done is separated each wire by cutting the joins and then pulled the wires apart. Using the nearest adhesive ribbon (sticky tape for the non-technical), I then twisted the wires around and sticky-taped them to hold them in place. You could use electrical tape or even shrink-wrapping for a more professional look.

Have fun modding!

Josh Freen

Our only concerns about separating the wires is potential cross-talk. The reason ATA/66 and ATA/100 cables have more wires is to insulate the data wires and prevent cross-talk. If they were separated and bound together, the cross-talk could come back, and hard drive performance could suffer.

#&@!

I have been a subscriber since issue 1, and have noticed that there is a little coarse language in your magazine. Now I don't mind this, but in your last issue there is an article titled 'Direct and to the point'. In this article the writer uses the 'f' word as slang. Now, there are young kids in my house and I wouldn't want them picking up your magazine and reading that. Come on, guys – a little slang is OK, but there is a limit to it.

Offended

In the context it was used in, we felt that a little #&@! wasn't entirely uncalled for. Our apologies to any parents who feel we betrayed their trust. We must point out that these are words which are found in just about any dictionary and conversation. We do try to be minimalist with usage, but Atomic, in many ways, is a magazine that speaks the same language as its readers.

Atomic theory

I was talking to a friend the other day about how they keep finding things that are smaller and smaller – the atom, protons, neutrons and electrons. Then they find what makes up electrons or whatever. But I think all the universe is made up of is really just 1's and 0's . . .

Jack O'Mahony

In which case the universe is based upon a 'solid' foundation of abstraction, lacking all substance and



📖 #1 reader
BobTheMonkey
camps in style.

spaciotemporality. Furthermore, half the universe is made up of nothing; that is, 0s. And it is not just the absence of anything, but a nothing that is essential in making up somethings. Nasty.

It's a comfortable metaphor where 1s and 0s represent somethings and nothings, which together make up everything we know – a la Sartre. But let's face it – Sartre was a self-indulgent wanker, and anyway, such a theory is poetic, but offers far less in terms of substance (no pun intended) than a theory of building blocks like atomic theory.

I lub j00 m0m

I am starting to get into the habit of saying 'Mum, take me to the LAN. I'll call j00 when I need to be picked up'. That is usually no problem. But when I arrive there with my beige beast, I can't help but wonder what life would be like if I had a black case with a perspex side, rounded IDE cables and those little wire sleeves – and, of course, the neon light!

Spanx for j00.

Chris Merritt

Seedy mags

Being a jobless computer junkie, my whole life revolves around a little box that sits on my desk. I spend a lot of money on computer magazines, purchasing nearly every one of them available. However, I would like to praise you guys for going with the most brilliant decision of not providing a cover disc. I think, in doing so, it has made your mag the cheapest on the shelf.

A cover disc adds to unnecessary costs and every time I buy a magazine with a cover disc I usually just throw it away. I know every time I buy a copy of Atomic it's money well spent and worth every cent. Keep up the fantastic work, guys.

Marty

That's what we figured in the beginning. Thanks!

Forever good

Just like to say great mag, and I hope it stays this good forever.

Ben Hogg

Same here!

Send your questions to
post@
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Atomic
Letters
PO Box 275,
Beaconsfield
NSW 2014

F R E E S T U F F

Welcome again to the Monthly Page of Freeness. This freeness isn't for everybody, else chaos would ensue and we'd all be destroyed by giant robots from the moon. So, we've attached a small challenge to each freeness opportunity in order to ensure we need only exist in this one universe we call home.

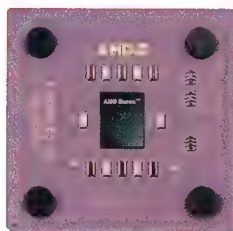
1GHz Duron CPU

Atomicans know well that it's OK to feel affection for PC hardware. We're all completely comfortable about that.

Especially loved by many a PC enthusiast is AMD's sweet baby Duron CPU. Cheap, potent and delightfully overclockable. Now our baby has finally hit 1GHz and it feels strangely like a popular kid's birthday party. Celebrations are clearly in order, so we dipped into AMD's Popular Staff Member Birthday Party Fund, which turned out to contain two 1GHz Duron CPUs! We were as feraked out as you probably are now!

All you need to do is get the following question right and have the good fortune to be selected randomly as a winner. How good? Too good.

Q. What was Duran Duran's first hit single?



MechCommander 2

Why would you want wheels on your armoured vehicle when two hydraulic legs are an option? Too right. More stomping fun from Microsoft comes this month in the form of MechCommander 2. Des gives the treatment on page 76, and you have the chance to win a copy. We've got five to give away to randomly drawn entrants that manage to answer this:



Q. Are Daleks robots or sentient biological creatures?

Smart and lucky Atomicans

I-War 2: Edge of Chaos

Q. Who is officially credited with discovering the distance between Earth and Hell?

A. Giovanni Domenico Cassini

M. Hadley, Taping NSW, A. Sun, Red birds VIC

E. Manning, Mt Lawley WA, * George, Alanvale TAS

J. King, Bell Post Hill VIC, * Baker, Forrestfield WA

Morpheus GeForce3

Q. Why aren't computer chips made out of wood?

A. Because wood doesn't conduct electricity. Every single entry had that answer. So, naturally we chose the most amusing and informative answer.

Congratulations to J. R. Hadley, Capalaba QLD!

The latest attempts to develop computer chips from wood illustrate the problems facing this growing industry. The experimental Intel Itanium processor is manufactured with a laminate made from three year-old trees. A laminate kernel was 0 to 100 microns 3 level transfers. It is not clear if older trees, with four or more age rings, will be suitable due to more defects in the wood. Interestingly, these defects are the raw material for the KNO₃ logic gate, which is the root from which this new branch of technology has sprouted. However, the industry is not out of the woods yet. There are some fundamental issues to be worked out before it will be clear whether or not computer companies are banking up the wrong tree. One difficulty is that these chips have a tendency to smoulder during flame wars. It is possible that water-cooling technology may be the answer. Video cards present further problems with colours tending to leaf green and dark brown, although shading is excellent. There is also the issue of sound cards that use these chipsets not having good timbre. Most seriously, the Wintel for Windows development team is stamped by bugs. It is believed that Microsoft will overcome the problem by creating some features and shipping a two-down version.

Email entries to win@atomicmpc.com.au or post them to Atomic, Competition Name, PO Box 275, Beaconsfield

NSW 2014. Closing date for entries is 17 October 2001. Winners will be announced in Atomic 11.

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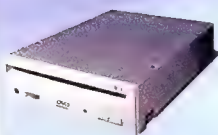


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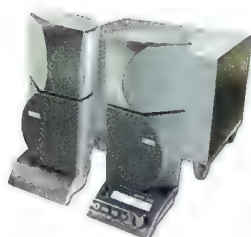
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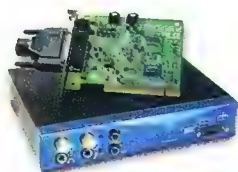
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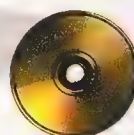
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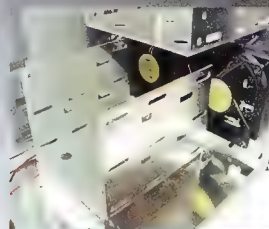
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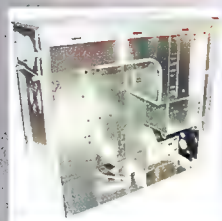
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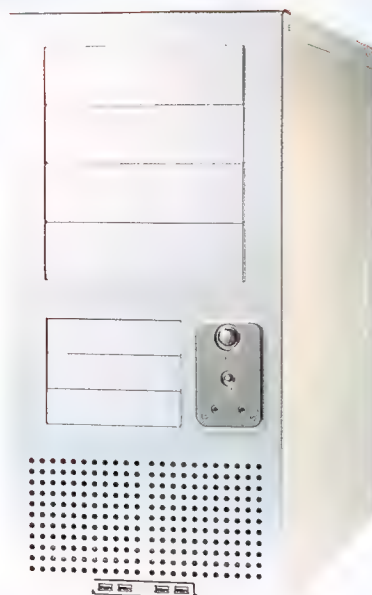
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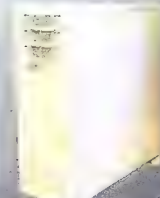
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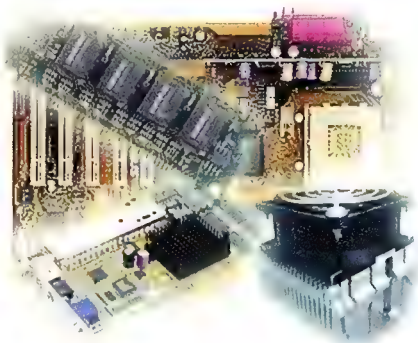
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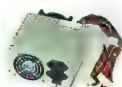
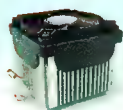
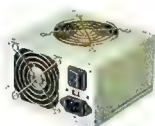
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Hardware inevitabilities

We all know about those fancy-pants laws that allegedly govern the construction and development of the PC. From the Law of Thermodynamics to Moore's Law, it seems that everyone has some highfalutin name for 'commonsense'. In an effort to cut through the somewhat enormous amounts of bullshit that dominate the hardware industry, here is a concise list of the laws you actually NEED to know when building and running your brand-new PC.

- It does not become easier to attach heatsink/fan clips after four beers.
- No matter how well you prepare, or how thick the gloves you are wearing, you will still lose all the skin off at least one knuckle when installing a motherboard.
- It is very possible to power up a motherboard using only the zipper on your fly
- Any strange hardware problems will always be fixable by playing with the dipswitches or jumpers that sit on the corner of the motherboard that is obscured by cabling and drive bays.
- No matter how much effort you put in, the custom paint job on your CD and floppy drives will never truly match the custom paint job on your case.
- Despite the number of warnings you give to people, someone will always decide to trip a circuit-breaker by turning on a heater, washing machine, dryer and kettle midway through a BIOS flash.
- Even if you follow the motherboard manual to the letter and double-check, you will still end up wiring the hard disk drive LED to the power LED of your case.
- At some point in time, installing a USB device will kill your operating system. There is no logic behind it, and the time period is unpredictable, but it is inevitable.

- Sound cards will always conflict with something, even when left in their original packaging.
- The chance of a system-wide crash is inversely proportional to the amount of time since you last saved. If you are completing a thesis or major report, the system crash will occur approximately midway between the last word being typed and the Save button being hit.
- If your CPU fan is ever going to stop working, it will wait until five seconds after you just dash out of the house to go to the shops.
- Approximately 7.38 seconds after you receive your new video card it will be superseded by something significantly faster and cheaper.
- Approximately 3.45 seconds after you receive your new CPU, Intel and AMD will announce 50% price cuts.
- No matter how hard you try, your carefully measured, laser-cut perspex panel will never match the carefully measured, laser-cut hole in the case.
- When you spill soft drink on your keyboard, it will always manage to gum up the most commonly used key.
- The one disk that your drive refuses to read will either be your favourite game, DVD or music CD.
- The only time that you ever have to worry about your power supply dying is approximately five minutes before you are due to play the most important CounterStrike clan match of your life.
- If any component of your system is going to die, it will do so the day before the five-year wait for the release of the next killer game is over.
- If any two components are going to conflict with each other, they will be the two most expensive ones.





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